FGF984P-AB
22/06/2010

CSB4/K531/K632

Firmware upgrade procedure

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TABLE OF CONTENT

1. INTRODUCTION

1.1. ABSTRACT

SpringCard CSB4, K531 and K632 products are based on the same hardware platform: a contactless interface (ISO/IEC 14443 only for CSB4 and K531, both ISO/IEC 14443 and 15693 for K632) and a microcontroller.

This document explains how to upgrade the firmware of the microcontroller with the flash upgrade software provided by the manufacturer of the microcontroller.

1.2. COVERED PRODUCTS

At the date of writing, this document refers to the following list of products:

- CSB4-U and CSB4-S[1],
- K531, K531-TTL, K531-232[2],
- K632, K632-TTL, K632-232,
- RDR-K632-TTL, RDR-K632-232,.

Please read the datasheet of every product for specifications and the detailed list of features.

1.3. AUDIENCE

This manual is designed for use by technical support or after-sale teams. It assumes that the reader has expert knowledge of electronics.

1.4. SUPPORT AND UPDATES

Interesting related materials (product datasheets, application notes, sample software, HOWTOs and FAQs…) are available at SpringCard's web site:

www.springcard.com

Updated versions of this document and others will be posted on this web site as soon as they are made available.

For technical support enquiries, please refer to SpringCard support web page at www.springcard.com/support .

[1] CSB4.3 (based on K531-2R or K531-4R core) only. Earlier CSB4, CSB4.1 and CSB4.2 versions (based on K531 or K531-R core) are not supported anymore.

[2] K531-2R or K531-4R only. K531 and K531-R are not supported anymore.

2. CHOOSING THE COMMUNICATION INTERFACE TO FLASH YOUR PRODUCT

2.1. CSB4-U OR CSB4-S

CSB4-U and CSB4-S have an internal switch to control whether the microcontroller is in flash upgrade mode or in operation mode.

You must open the device to access this switch.

Disconnect your CSB4-U from the computer before opening the cover or moving the switch.

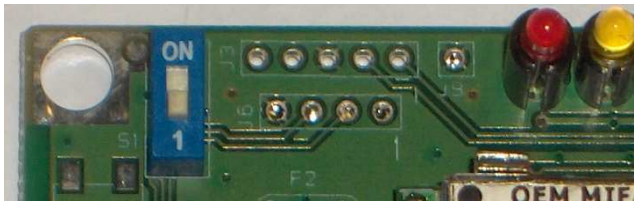
Remove power supply (unplug the jack) from your CSB4-S before opening the cover or moving the switch.

2.1.1. Opening the device

Use a **PH1** screwdriver to remove the four screws under the product.

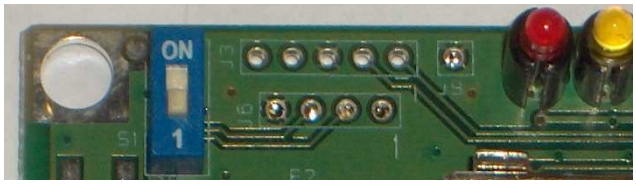
Remove the cover to access the PCB.

2.1.2. Switching the microcontroller to flash upgrade mode



Move the switch to the ON position.

2.1.3. Switching the microcontroller back to operation mode



Move the switch to the OFF position (near digit "1")

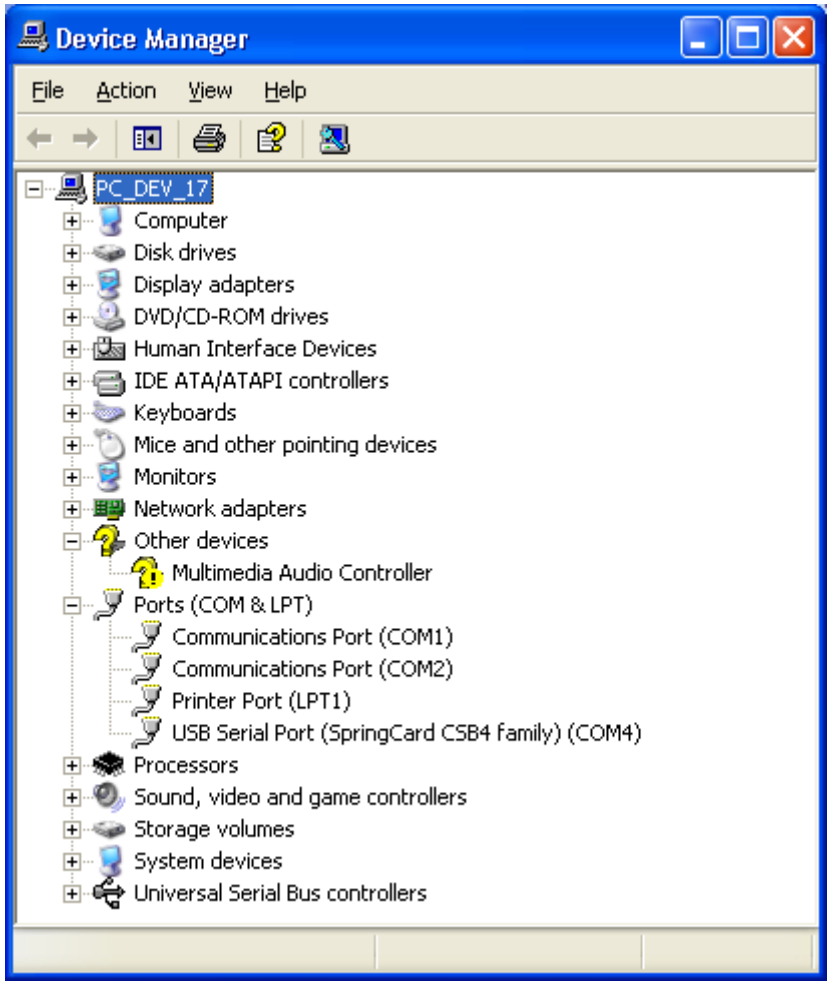
2.1.4. Closing the device

Be careful that the 2 screws going to the top (near the LEDs) are a bit longer than the 2 screws going to the bottom. Putting the long screws in the bottom holes will damage the product.

Do not over screw.

2.1.5. Detecting the CSB4 in flash upgrade mode via Device Manager

After putting your CSB4 in flash upgrade mode, open your Device Manager. When plugging your CSB4, you should see it appear in the "COM & LPT" section:



2.2. K531-TTL, K632-TTL AND RDR-K632-TTL

K531-TTL is a K531 mounted on an antenna featuring a serial interface at TTL level.

K632-TTL and RDR-K632-TTL are a K632 mounted on an antenna featuring a serial interface at TTL level.

Please refer to the product datasheet, section *pinout* to see how the product must be connected for either operation or flash upgrade mode.

Do not apply a voltage above 5V on any pin of the connector. Especially an RS-232 interface (with signals at –12/+12V) may destroy the K531-TTL, K632-TTL or RDR-K632-TTL.

SpringCard also offers a **serial TTL to USB interface** which is the easiest way to connect your TTL product to your computer. This interface includes a switch to put the device in flash upgrade mode, and a reset press-button to allow immediate mode change without unplugging the device.

USB interface for SpringCard TTL products (order code: INT-USB-TTL)

2.3. K531-232, K632-232 AND RDR-K632-232

K531-232 is a K531 mounted on an antenna featuring a serial interface at RS-232 level.

K632-232 and RDR-K632-232 are a K632 mounted on an antenna featuring a serial interface at RS-232 level.

Please refer to the product datasheet, section *pinout* to see how the product must be connected for either operation or flash upgrade mode.

The INT-USB-TTL interface will not work with RS-232 products.

2.4. K531 AND K632 MODULES

To be written.

3. GETTING STARTED WITH RENESAS FDT

The microcontroller of **SpringCard CSB4 and K531** is based on Renesas R5F21256 (R8C/25 with 32kB of code memory).

The microcontroller of **SpringCard CSB4 and K531** is based on Renesas R5F21258 (R8C/25 with 64kB of code memory).

This microcontroller is upgradeable on the field, through its serial interface, thanks to Renesas Flash Development Toolkit (FDT) version 4 or newer.

FDT is a Windows program that runs on 2000/XP/Vista.

3.1. DOWNLOAD AND INSTALL FDT

The latest version of FDT is available free of charge at Renesas' website:

- Go to www.renesas.com.
- Navigate to Development Tools → Flash and PROM Programming → Flash Development Kit.
- Choose « Download the latest version of FDT free of charge ».

You'll be prompted for your company details before accessing the download.

Note: Renesas' website changes frequently, and its URLs are not « user friendly », therefore preventing us to give the actual link here. Alternatively, you may temporarily download FDT 4.00 (R00) at

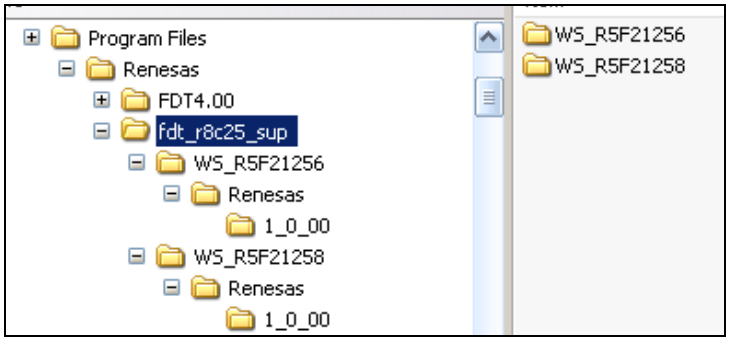
www.springcard.com/download/tmp/fdtv400r00.exe

3.2. DOWNLOAD AND INSTALL THE R8C/25 SUPPORT FILES

Default installation of FDT only offers a limited support of both microcontrollers. Please download the following support file:

www.springcard.com/download/tmp/fdt_r8c25_sup.zip

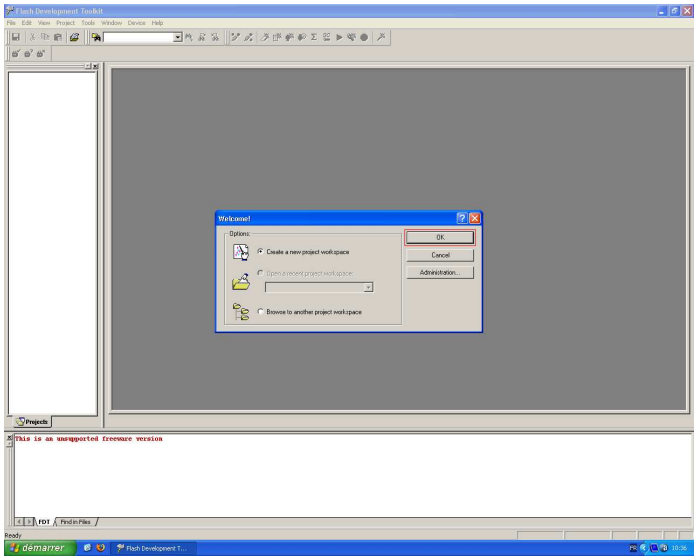
Unzip the downloaded zip file on your computer's hard drive. Remember the directory where you have unzipped the file.



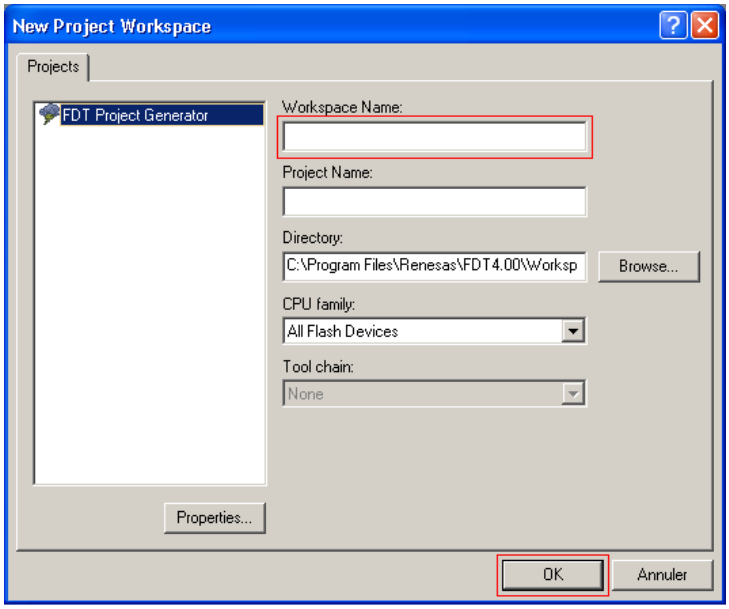
3.3. CREATE A WORKSPACE FOR CSB4 OR K531

CSB4 and K531 have 32kB of flash memory for code, where K632 has 64kB. Be sure to create a different FDT workspace for each family.

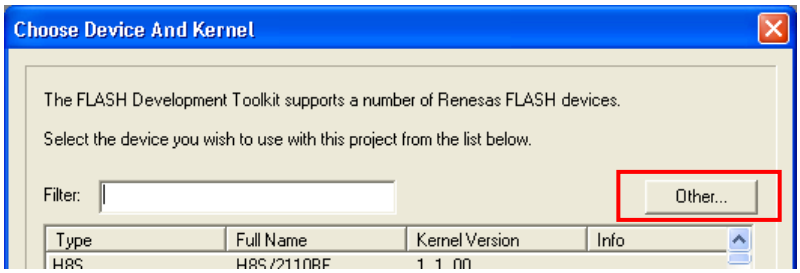
- Launch FDT from Start Menu.



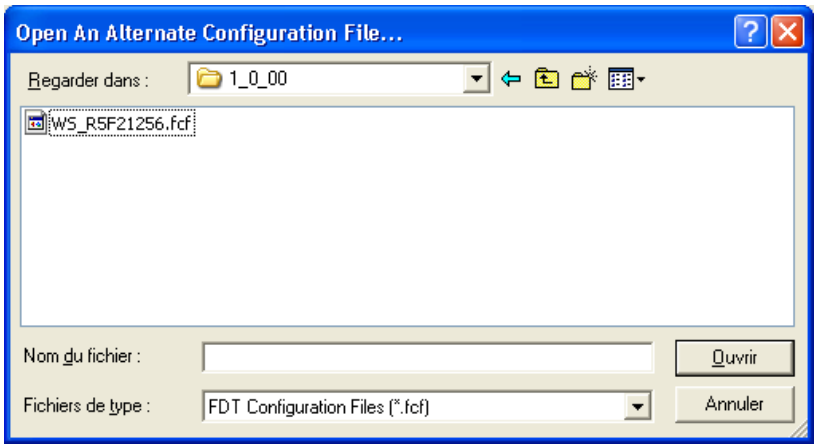
- Choose « create a new project workspace », and click « OK ».



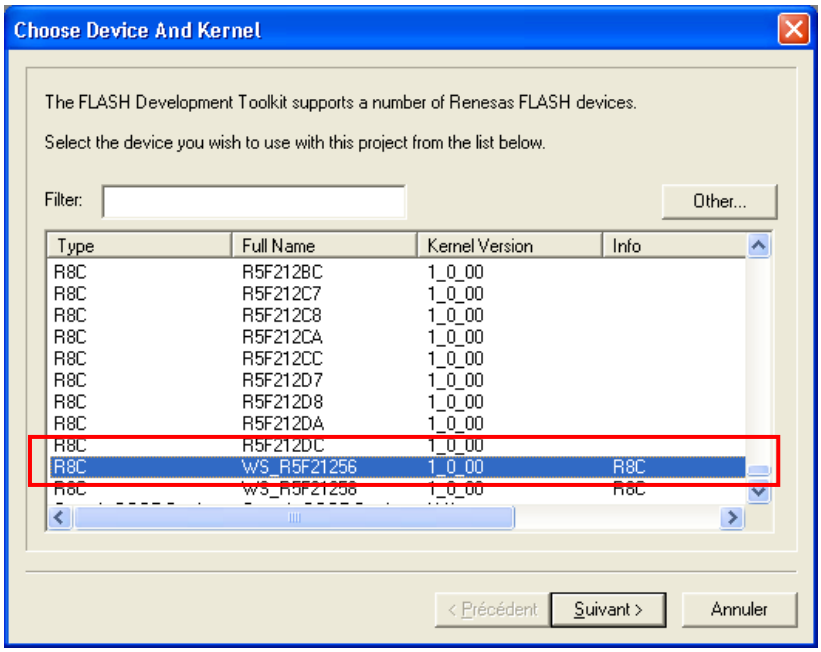
- Enter a name for your new project workspace (for instance, *R8C25_32*), and click « OK ». If left blank, the default project name is the same value as the workspace name.



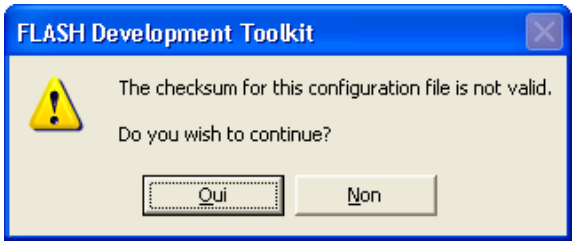
- In the « Choose Device And Kernel » box, click « Other… »



- In the « Open An Alternate Configuration File… » box, browse to the folder where you've unzipped the **fdt_r8c25_sup.zip** file, then browse into subfolder named **WS_R5F21256** until you reach the target file
- Select the target file **WS_R5F21256.fcf** and click « Open »

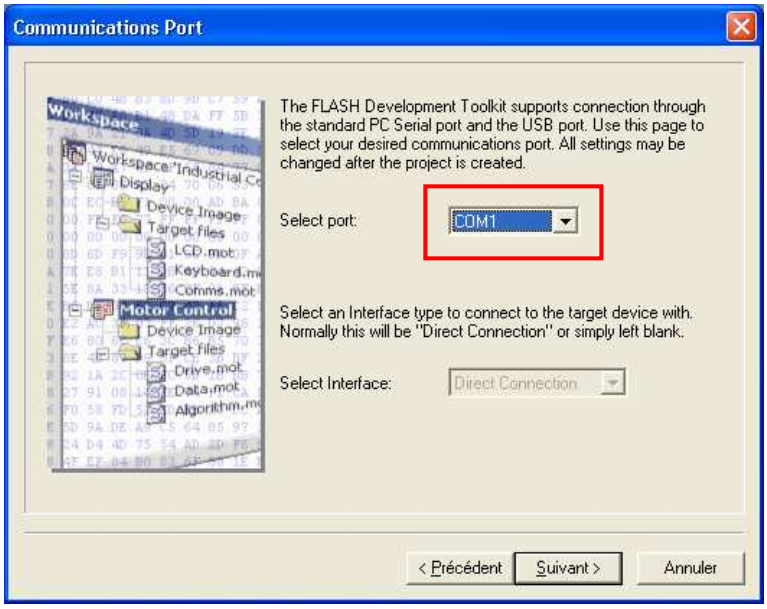


- Now back to the « Choose Device And Kernel » box, scroll-down and select **WS_R5F21256**. Click « Next »

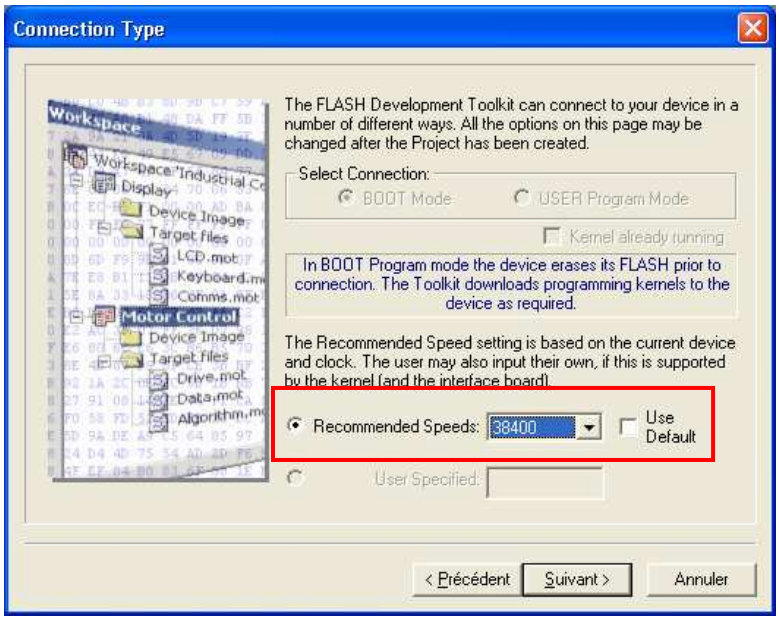


- You may be notified that the checksum of the file is invalid. Click « Yes » to ignore this warning.

You must now select the serial communication port your device is connected to. Please read chapter 2 if you don't already know this information.



- Choose the right port, and click « Next ».

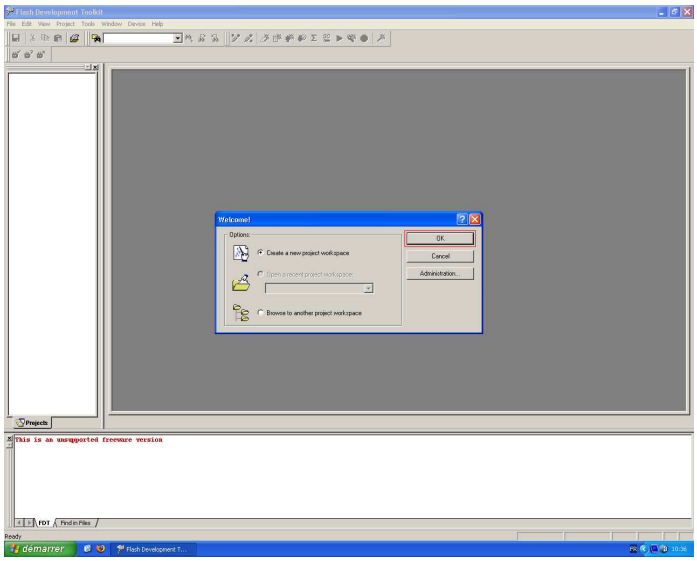


- Uncheck the « Use default » checkbox, and choose **38400 bps** in the list. Click « Next »
- In the following pages, click « Next » (leaving all options to their default value), until « Finished »

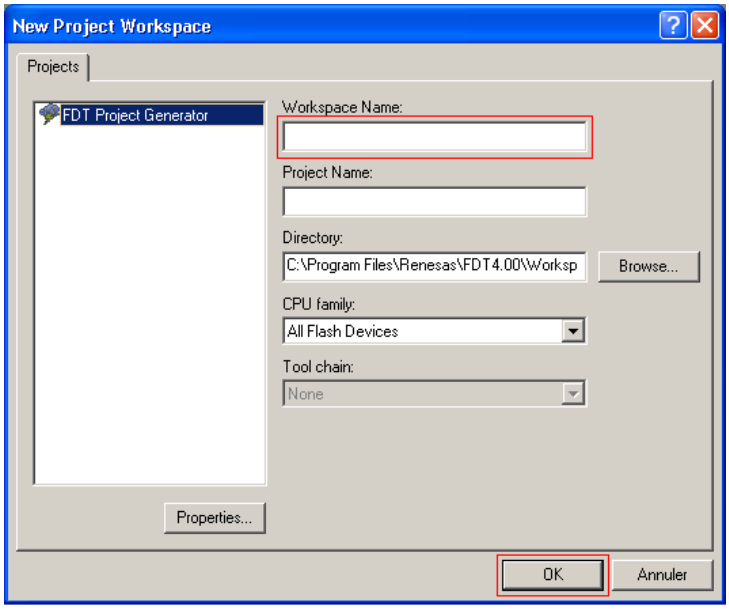
3.4. CREATE A WORKSPACE FOR K632

CSB4 and K531 have 32kB of flash memory for code, where K632 has 64kB. Be sure to create a different FDT workspace for each family.

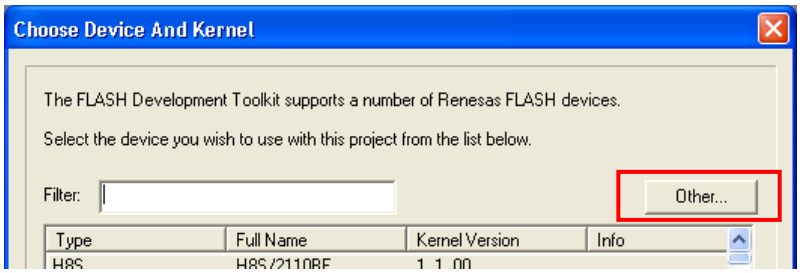
- Launch FDT from Start Menu.



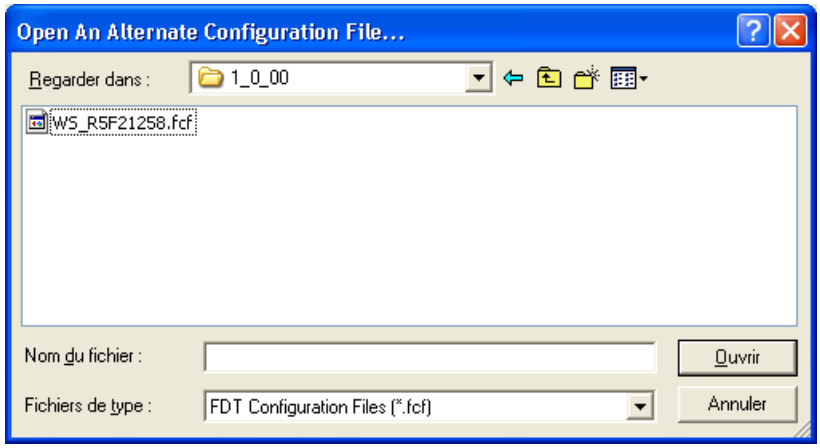
- Choose « create a new project workspace », and click « OK ».



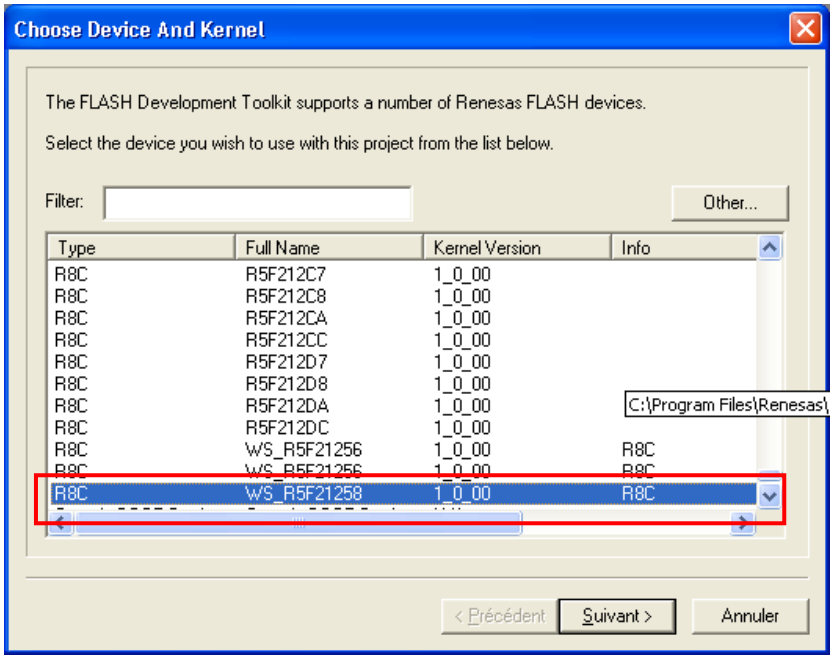
- Enter a name for your new project workspace (for instance, *R8C25_64*), and click « OK ». If left blank, the default project name is the same value as the workspace name.



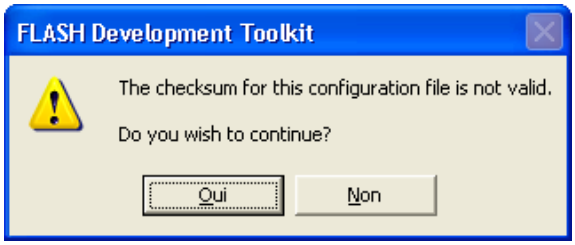
- In the « Choose Device And Kernel » box, click « Other… »



- In the « Open An Alternate Configuration File… » box, browse to the folder where you've unzipped the **fdt_r8c25_sup.zip** file, then browse into subfolder named **WS_R5F21258** until you reach the target file
- Select the target file **WS_R5F21258.fcf** and click « Open »

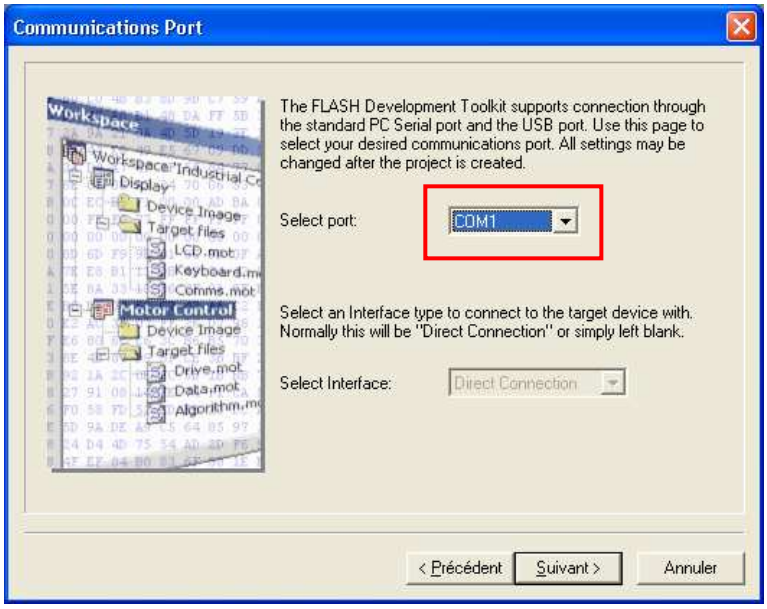


- Now back to the « Choose Device And Kernel » box, scroll-down and select **WS_R5F21258**. Click « Next »

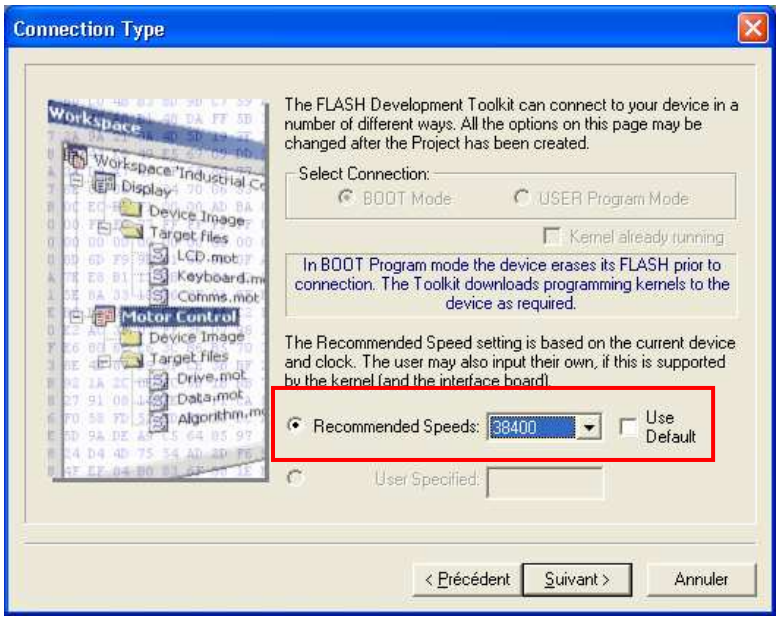


- You may be notified that the checksum of the file is invalid. Click « Yes » to ignore this warning.

You must now select the serial communication port your device is connected to. Please read chapter 2 if you don't already know this information.



- Choose the right port, and click « Next ».

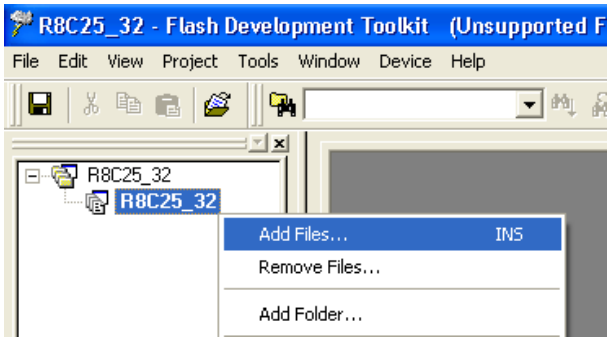


- Uncheck the « Use default » checkbox, and choose **38400 bps** in the list. Click « Next »
- In the following pages, click « Next » (leaving all options to their default value), until « Finished ».

3.5. ADD A FIRMWARE TO YOUR WORKSPACE

In the following screenshots, we focus on the FDT workspace for CSB4 or K531 (*R8C25_32*). Of course when working with a K632 product, use the appropriate workspace (*R8C25_64*).

- In the tree on the left, right click on the project.



- In the popup menu, click on « Add Files… »
- Browse to the firmware file you want to download in the product (firmware files have the « .mot » extension).

4. HOW TO FLASH YOUR PRODUCT

4.1. SELECT THE RIGHT FIRMWARE FOR YOUR PRODUCT

All the CSB4/K531 group products and all the K632 group products share a large part of their hardware including their microcontroller, but of course they behave differently, due both to their hardware specificities and to their own specifications.

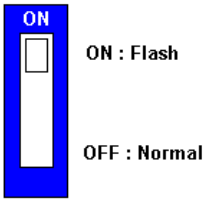
Generally speaking, putting the wrong firmware in any product is possible, and may appear to work, but this is not the way the product is intended to operate.

Please make sure to always put the appropriate firmware in your product.

4.2. SWITCH THE MICROCONTROLLER TO FLASH UPGRADE MODE

Please read chapter 2 to learn how to put your device in flash upgrade mode.

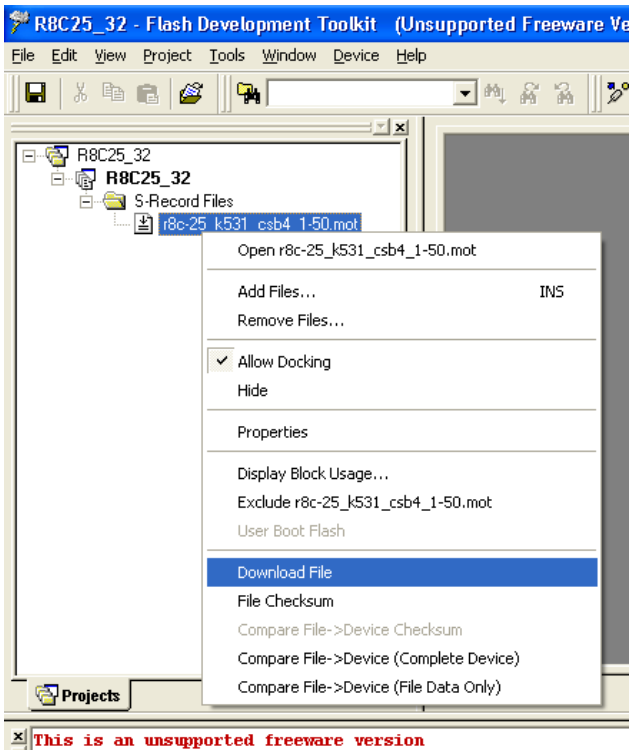
For the products featuring one « Flash Mode » switch, move the switch to the ON position.



Cycle power or reset the product.

4.3. FLASH THE PRODUCT

- Back to FDT screen, right click on the file you want to download in the device.

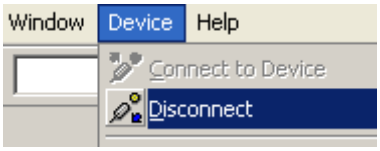


- In the popup menu, click « Download File »
- Wait during the flash operation (this takes 20 to 60 seconds)

```
Clock Frequency = N/A, Clock Mode = N/A, CKM = N/A, and CKP = N/A
Connecting to device 'WS_R5F21256' on 'COM4'
Configuration:
'BOOT Mode' connection - using emulated interface
Opening port 'COM4' ...
Loading Comms DLL
Loaded Comms DLL
Initiating BOOT SCI sequence
Attempting 9600
Changing baud rate to 38400 bps
ID code check successful
Connection complete
Lock Bit Disabled

All blocks marked as unknown written status

Erasing 2 blocks from device
Erased block EB1 (0x00008000 - 0x0000BFFF)
Erased block EB0 (0x0000C000 - 0x0000FFFF)
Erase complete

Processing file :"I:\projects\springcard\springprox\firmware\_output\r8c-25_k53l_csb4_1-50
[Data Flash] - No Data Loaded
Operation on User Flash
Writing image to device... [0x00008000 - 0x0000FFFF]
Data programmed at the following positions:
 0x00008000 - 0x0000FFFF      Length : 0x00008000
32 K programmed in 39 seconds
Image successfully written to device
```

- Check that the output ends by « Image successfully written to the device »

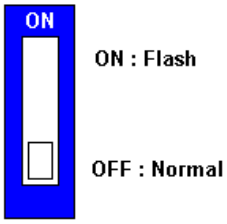
- End the procedure by clicking on « Disconnect » in the « Device » menu.



4.4. SWITCH THE MICROCONTROLLER BACK TO OPERATION MODE

Please read chapter 2 to learn how to put back your device in operation mode.

For the products featuring one « Flash Mode » switch, move the switch back to the OFF position.



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