

## SmartRF04<sup>®</sup>EB Troubleshooting

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### Keywords

- SmartRF04<sup>®</sup>EB
- EM
- CC1100
- CC1110
- CC1150
- CC2430
- CC2431
- CC2500
- CC2510
- CC2511
- CC2550

### 1 Introduction

This design note describes troubleshooting guidelines to solve problems related to communication with the SmartRF<sup>®</sup>04EB. A list of checkpoints

presents questions that are normally asked when providing support for SmartRF<sup>®</sup>04EB.

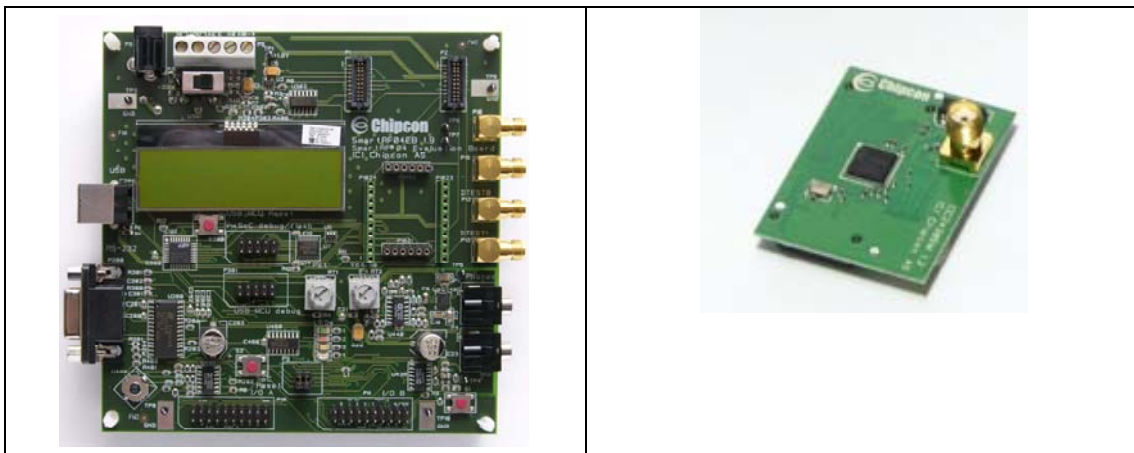


Figure 1. SmartRF<sup>®</sup>04EB + EM

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## 2 Abbreviations

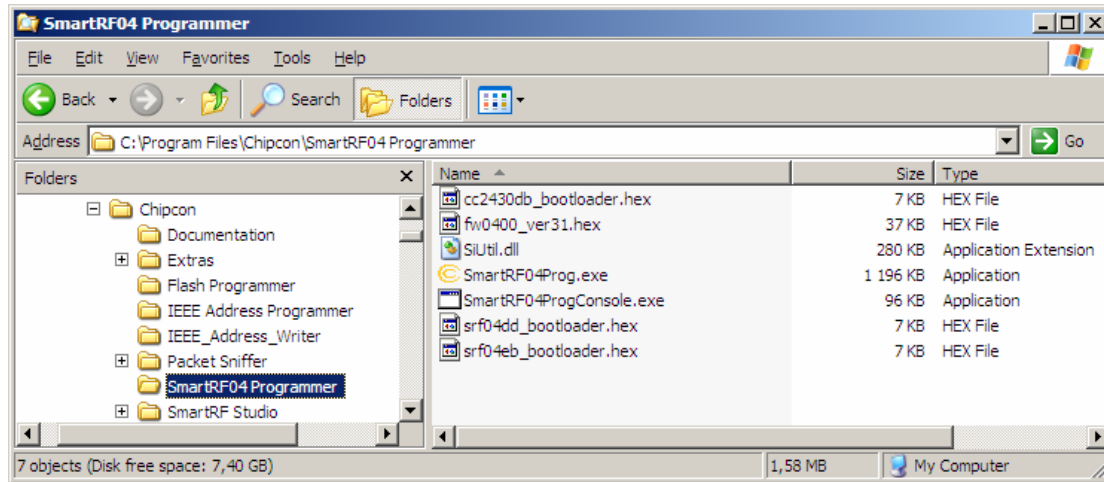
EB	SmartRF <sup>®</sup> 04EB Evaluation Board
EM	Evaluation Module
SoC	System on Chip

### 3 Troubleshooting Process

This procedure describes a step-by-step procedure for troubleshooting.

#### 3.1 Prepare

- Download the Chipcon Flash Programmer [1]. The Flash Programmer is distributed as an installer inside a Zip-file. The installer file should be unpacked on the hard drive and executed. After installing, the Flash Programmer can be started by choosing “All Programs, Chipcon, SmartRF®04 Flash Programmer” from the start menu in Windows.



**Figure 2. Flash Programmer Default Installation**

- Download and install SmartRF®04 Studio [2]. It is recommended to always install SmartRF® Studio, because it will set up Windows to locate all drivers for SmartRF®04EB automatically.
- Alternatively, the latest version of IAR Workbench for 8051 should be installed (<http://www.iar.com>). Navigate to the folder: C:\Program Files\IAR Systems\Embedded Workbench 4.05\8051\drivers\chipcon when Windows asking for the location for the drivers.

#### 3.2 Driver Installation

- Remove any EM connected to the SmartRF®04EB.
- Connect a USB cable from SmartRF®04EB to the PC. If the drivers are not installed, Windows will ask where they are located. Press “next” or “ok” in all dialogs that appear. SmartRF® Studio has already installed the drivers in the appropriate way.
- After the drivers are installed, make sure the installation was successful. This can be done by navigating to Device Manger and verifying that the group named “Cebal controlled devices” is present. An example screen shot from Device Manager after a successful installation is shown below.

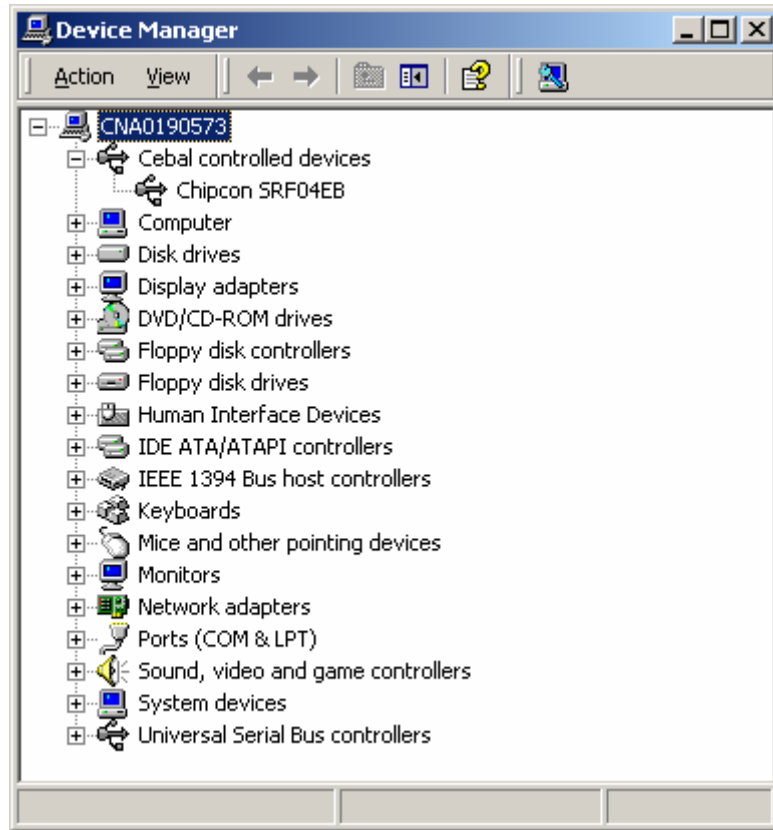


Figure 3. Device Manager

### 3.2.1 If the “Cebal Controlled Devices” is not Displayed

- Is the SmartRF04<sup>®</sup>EB board powered up? Switch S3 should be in the right position when USB power, batteries or the DC power jack is used to power the board. Verify the 3.3V power by measuring it with a voltmeter or multimeter connected between TP2 to the left of the power switch (S3) and any of the GND testpoints.



Figure 4. Power Switch S3 on SmartRF<sup>®</sup>04EB

- Is the USB cable properly connected? Disconnect both ends of the cable and reconnect. If it still does not work, try another port or try another cable.
- Try another SmartRF04<sup>®</sup>EB. All kits contain at least two EB's.
- Try another PC. If it works on another PC, TI can not help you to solve this problem.
- Check Device Manager for USB conflicts or erroneously installed USB drivers: If any drivers under “Universal Serial Bus” controllers or “Cebal Controlled Devices” are marked with an exclamation mark (see Figure 5), right click these drivers and choose uninstall. Necessary drivers will be reinstalled the next time the associated HW is connected.

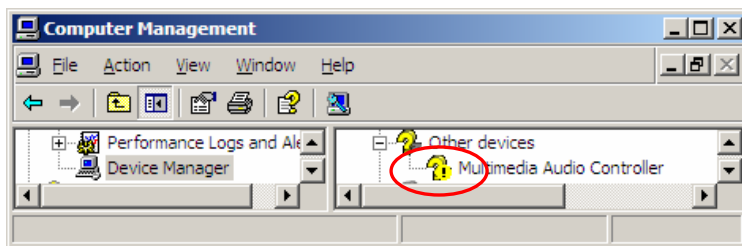


Figure 5. Exclamation mark in Device Manager

### 3.3 Upgrading the SmartRF®04EB Firmware using Chipcon Flash Programmer

- Remove any EM connected to the SmartRF®04EB.
- Start the Flash Programmer. A screen shot is shown in Figure 6.

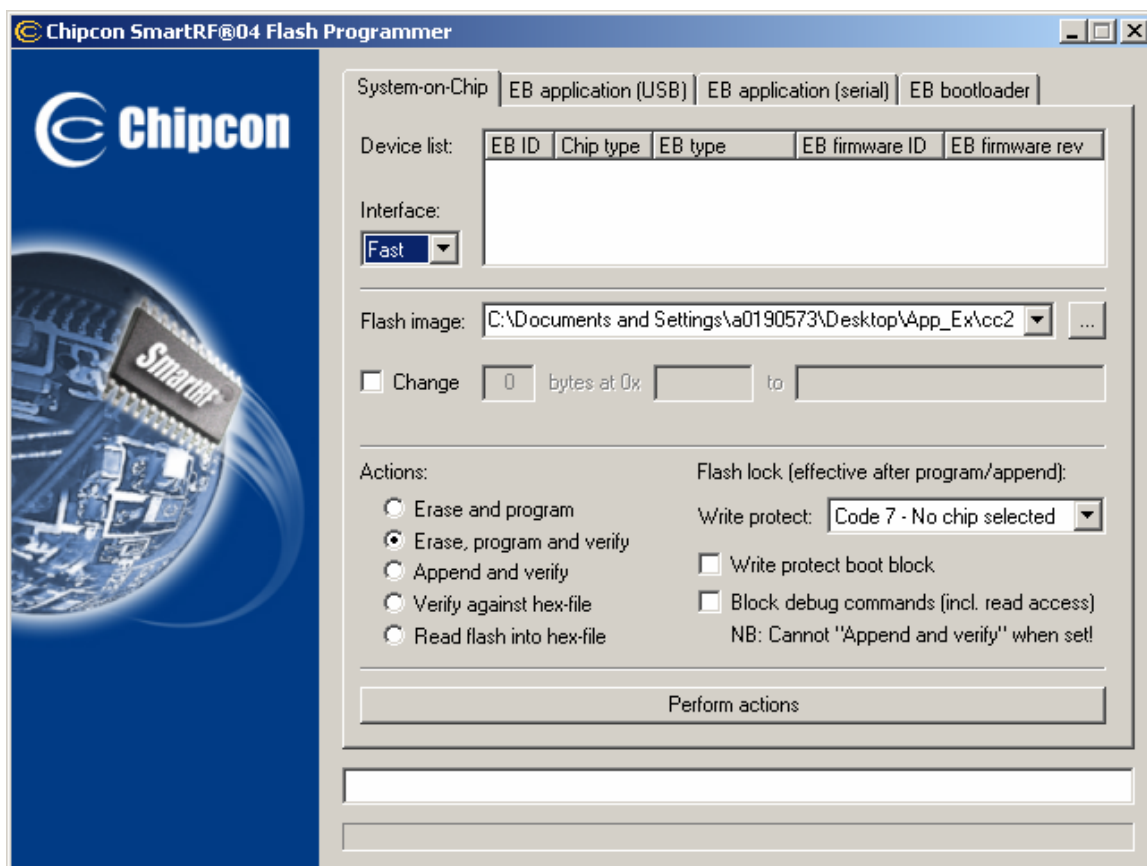


Figure 6. Flash Programmer

- Choose to the “EB application (USB)” tab as shown in Figure 7.

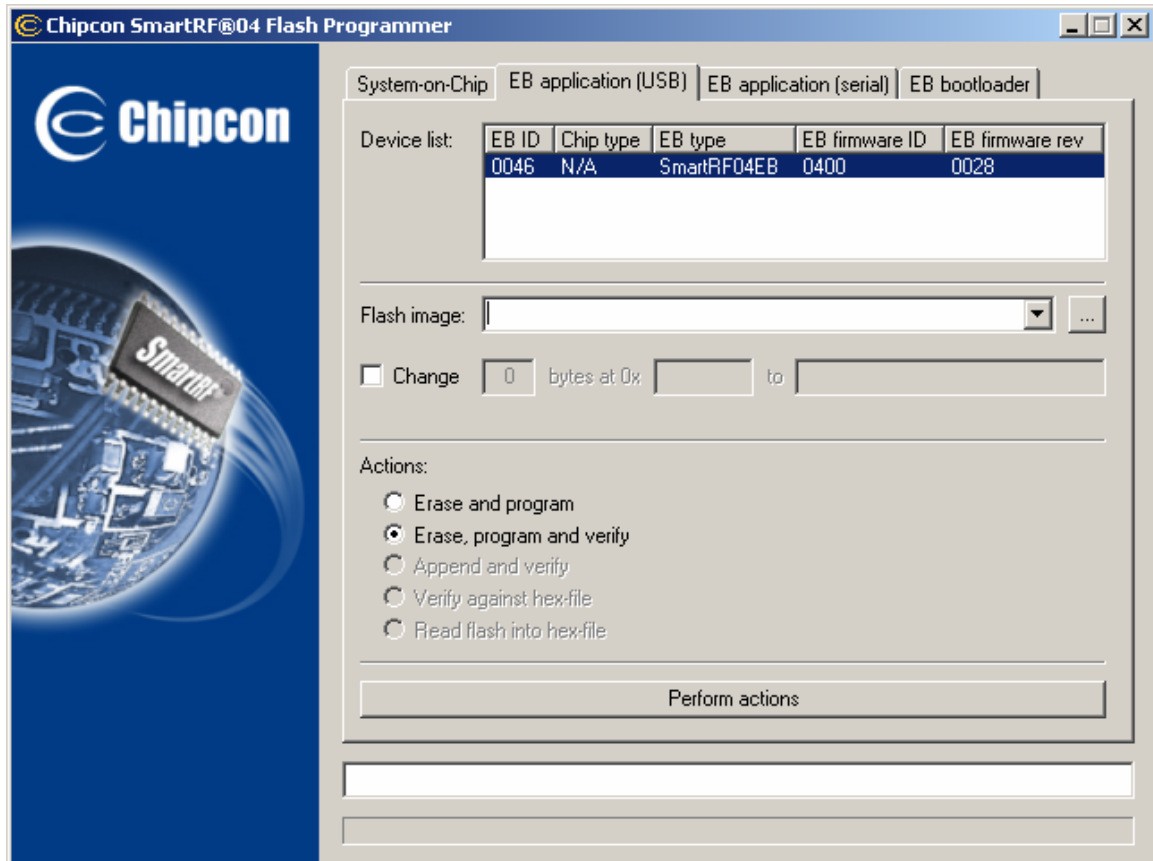


Figure 7. EB Application (USB) Tab

- Switch the EB power switch (S3) on and off a few times and verify that the board appears / disappears in the device list.
- Verify that “Chip type” is “N/A” as shown in the figure above.
- Update EB firmware with the hex file that is distributed together with the Flash Programmer. The default location for the hex files is shown in Figure 2.
  - Click the button labelled “...” on the right side of “Flash image:” field.
  - Navigate to the hex file. It’s named “fw400\_verXX.hex”. Then click OK. XX is the version number.
  - Check that “Erase, program and verify” is selected under “Actions:”.
  - Click “Perform actions”.
  - Verify that “EB firmware rev.” shows correct firmware revision.

### 3.3.1 This Procedure Fails; What Should I Do?

- Check that the driver installation procedure succeeded, see chapter 3.2.
- Was there an EM connected to the SmartRF04<sup>®</sup>EB? The EM must be disconnected for this procedure to work.
- Test with another EB.
- Is more than one SmartRF<sup>®</sup>04EB connected to the computer? It is recommended to perform this procedure with only one EB connected.
- Check that the EB bootloader is not erased or damaged, see chapter 3.6.

### 3.4 Verify the EM

- Turn off SmartRF04<sup>®</sup>EB power and mount the EM.
- If the EM connected contains a SoC (System on Chip) e.g. CC1110, CC2430, or C2510, switch to the “System-on-chip” tab in the Flash Programmer. If the EM is not a SoC, stay in the “EB application (USB)” tab.
- Turn on SmartRF04<sup>®</sup>EB power.
- Verify that it appears in the device list.
- Verify that “Chip type” equals the type of device on the EM (for example “CC1100”, “CC2500”, or “CC2430”).

#### 3.4.1 The Device does not Appear in the List

- Try another EM.
- Press and release the button marked “USB MCU reset” on the SmartRF<sup>®</sup>04EB (right below the LCD).
- Verify that I\_IN and I\_OUT are connected in the P5 power connector just above the power switch. All SmartRF<sup>®</sup>04EB are delivered with a jumper mounted between I\_IN and I\_OUT. If this jumper is removed, the EM will not be powered. To be sure, measure the voltage on I\_IN versus GND. Expected voltage is 3.3V.
- Check all pins that connect the EB to the EM. Do they all look good? None of them are broken? Check the soldering of all the connector pins.

In case the connectors on your board are physically damaged and you need to replace the connectors, the part number of the original P1 and P2 connectors on the SmartRF04<sup>®</sup>EB is: Samtec TFM-110-02-SM-D-A. The matching connectors on the EM boards are Samtec SFM-110-02-SM-D-A.

### 3.5 Use IAR Workbench to Download Code to and Debug a SoC

This chapter is only applies if you have an EM with a Chipcon System-on-Chip (SoC) device. If you have an EM with a Chipcon transceiver, please skip this chapter.

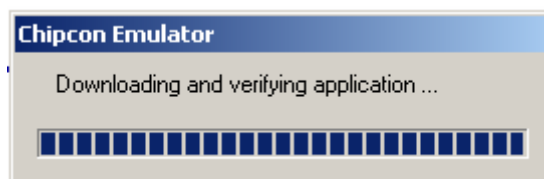
Since all points previous this one has succeeded this should not give any problems. Both the Flash Programmer and IAR are using the same USB interface. So if this step fails it is highly probable that one of the points above has failed. Please go back and verify that they really succeeded.

Open or create a project in IAR Embedded Workbench for 8051. Make sure the project compiles for the correct SoC device. For more information on setting up IAR Embedded Workbench, please see the IAR IDE User Manual [3].

Download the code to the device and start a debug session by choosing “Project” and “Debug” from the IAR menu.

This should happen:

- If only one EB is connected and it is turned on: This progress bar should appear



**Figure 8. IAR Embedded Workbench Progress Bar**

- If no EB's are connected (or they are switched off): A blank dialog box will appear. Switch the EB on and it will appear in the list. Choose the EB in the list and click "Select" to continue. The progress bar above should appear.
- If more than one EB is connected and switched on. Select the board you want to use in the list. Click "Select" to continue. The progress bar above should appear.

### **3.5.1 All Previous Steps have Succeeded, but Download and Debug Still does not Work**

It is probably something wrong with the IAR installation. Try to reinstall the IAR Workbench. Delete all the IAR files that are not deleted by the un-installer. Afterwards, re-install IAR and make sure that the latest patches are installed (they are available from [www.iar.com](http://www.iar.com)).

## **3.6 Reprogramming the SmartRF<sup>®</sup>04EB Bootloader**

The SmartRF<sup>®</sup>04EB is delivered with bootloader firmware that enables upgrading of the SmartRF<sup>®</sup>04EB application firmware over the USB interface. The bootloader firmware also contains the EB ID number. In theory it is not possible to erase or damage the bootloader firmware without using the USB\_MCU debug connector on the SmartRF<sup>®</sup>04EB, but we have seen rare cases where the bootloader firmware has been erased or damaged unintentionally. This chapter details the symptoms of a damaged bootloader and the steps required to reprogram it.

### **3.6.1 Symptoms of a Damaged Bootloader**

After having verified that the USB cable is connected properly, the voltage on TP2 relative to GND is 3.3 V, and that no EM is connected, these are the symptoms that the bootloader is erased or damaged:

- The SmartRF<sup>®</sup>04EB does not show up in the Flash Programmer EB Application (USB) Tab (see Figure 7).
- Or
- The SmartRF<sup>®</sup>04EB shows up in the Flash Programmer EB Application (USB) Tab, but repeated attempts to upgrade the SmartRF<sup>®</sup>04EB firmware following the procedure in chapter 3.3 fails.
- And
- Everything works as expected if the SmartRF<sup>®</sup>04EB is replaced by the other SmartRF<sup>®</sup>04EB board supplied in the kit.

### **3.6.2 Bootloader Reprogramming Procedure**

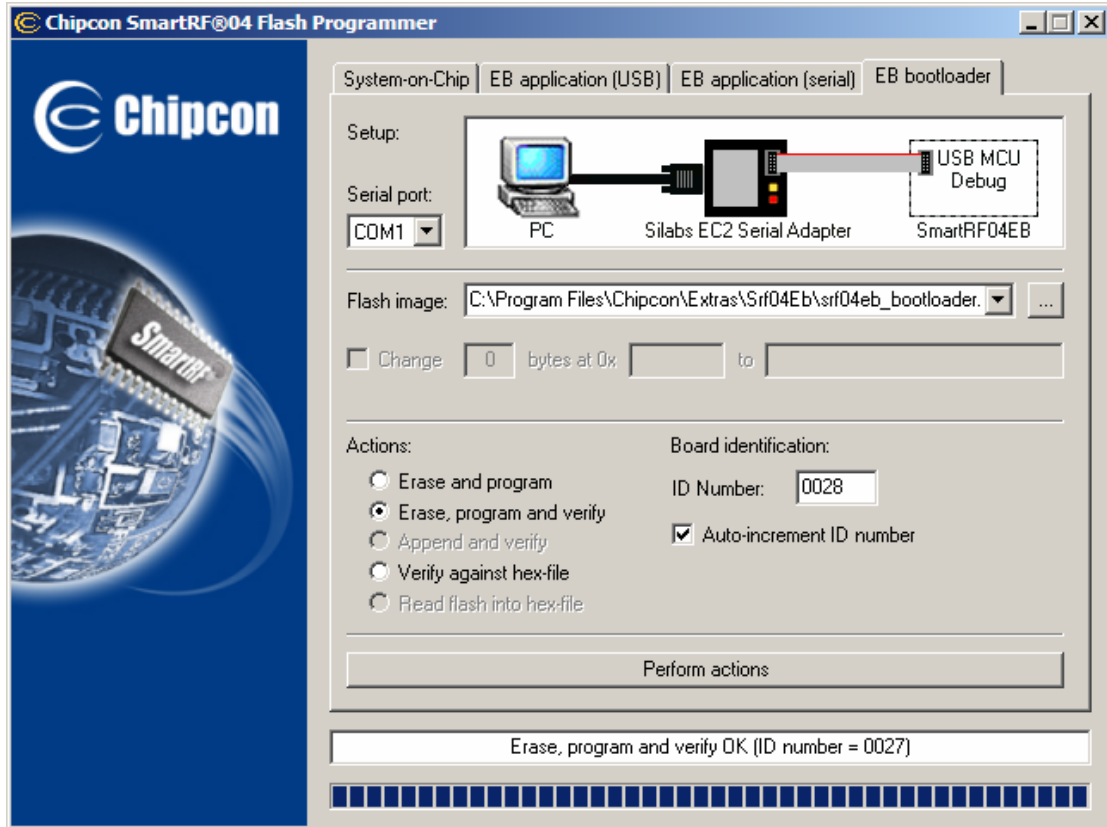
An EC2 serial adapter from Silicon Laboratories is required for this procedure. The EC2 is available through the SiLabs web site. Here is a direct link: [http://www.silabs.com/tgwWebApp/public/web\\_content/products/Microcontrollers/en/EC2.htm](http://www.silabs.com/tgwWebApp/public/web_content/products/Microcontrollers/en/EC2.htm)

- Connect the EC2 to the USB MCU debug connector (P301) on the SmartRF<sup>®</sup>04EB. Make sure that pin 1 on the EC2 is connected to pin 1 on the SmartRF<sup>®</sup>04EB. Pin one is the lower left pin on both boards.
- Connect the EC2 serial port to a serial port on your computer.
- Turn on power to the SmartRF<sup>®</sup>04EB, verify by measuring between TP2 and GND.
- Start the Flash Programmer and choose the EB bootloader tab (see Figure 9).
- Verify that the serial port selected is the one you used for the EC2.
- Update EB bootloader with the hex file that is distributed together with the Flash Programmer.
  - Click the button labelled "..." on the right side of "Flash image:" field.
  - Navigate to the hex file. It's named "srf04eb\_bootloader.hex". Then press OK.
  - Check the ID Number written in the text box below "Board identification". This ID number should not be equal to the ID of any other SmartRF<sup>®</sup>04EB you have. You can change the ID number to any 4 digit number you like.



- Check that “Erase, program and verify” is selected under “Actions:”.
- Click “Perform actions”.
- Verify that the status line at the bottom of the Flash Programmer reads “Erase, program and verify OK (ID number = xxxx)”, where xxxx is the ID number you specified.

After successfully having completed this procedure, update the EB application following the instructions in chapter 3.3.



**Figure 9. EB Bootloader Tab**

### 3.7 Other Issues to Check

- Do you have the latest firmware and software? Check your version against the version available on the TI web site:
  - Chipcon Flash Programmer
  - Libraries and application examples SW for your device
  - SmartRF® Studio
  - IAR Embedded Workbench for 8051 (check against [www.iar.com](http://www.iar.com))
- Are the SPI jumpers placed correctly? Check against the CC1110DK, CC2430DK, CC2510DK Development Kit User Manual (SWRU039). This is only applicable for SmartRF®04EB marked with revision number 1.9 and higher. (The PCB revision number printed right below the Chipcon logo.)
- Are all the default 0-ohm resistors mounted? Verify against the SmartRF®04EB schematics printed in the CC1110DK, CC2430DK, CC2510DK Development Kit User Manual. 0-ohm resistors that are mounted are designated R\_0\_0603 while unmounted resistors are designated R\_0603. The usage of the 0-ohm resistors is also described in the CC1110DK, CC2430DK, CC2510DK Development Kit User Manual [4].

#### **4 Checklist when Requesting Support**

When contacting customer support, please include this information:

- What is the Revision number for SmartRF<sup>®</sup>04EB? It is printed on the PCB, right below the Chipcon logo.
- What is the part and revision number for the EM? It is printed on the PCB, right upper corner.
- As much of the information printed on the chip as possible.
- Where in the procedure it failed.

## 5 References

- [1] [Chipcon Flash Programmer \(swrc044.zip\)](#)
- [2] [SmartRF<sup>®</sup> Studio \(swrc046.zip\)](#)
- [3] [IAR IDE User Manual \(swru038.pdf\)](#)
- [4] [CC1110DK CC2430DK CC2510DK Development Kit User Manual \(swru039.pdf\)](#)

## 6 General Information

### 6.1 Document History

Revision	Date	Description/Changes
SWRA105A	2007.04.16	Added instructions to verify +3.3V voltage on TP2 and I_IN. Added part number for EM connectors. Added chapter "Reprogramming the SmartRF@04EB bootloader". Added chapter "Other issues to check". Added more details to chapter "Use IAR Workbench to Download code to and Debug a SoC". Other minor text changes. Added references
SWRA105	2006.07.06	Initial release.

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