# IQRF Development Tools Installation Guide

## Application Note

# AN003

Simple way to smarter wireless solutions

## Development kits

**CK-USB-04** is intended for IQRF development. Other similar programmers / debuggers with USB connectivity, e.g. CK-USB-02 (obsolete) or GW-USB-03 can also be used.

## PC operating systems

Windows 2000, XP, Vista and Windows 7 are supported.

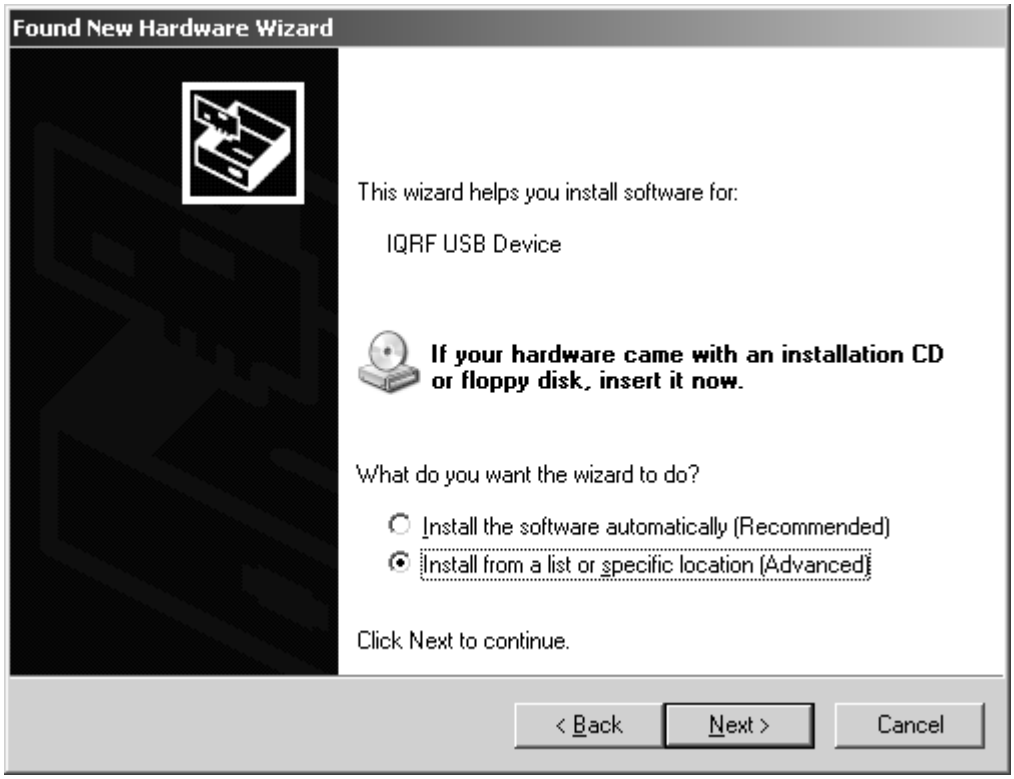
## Software

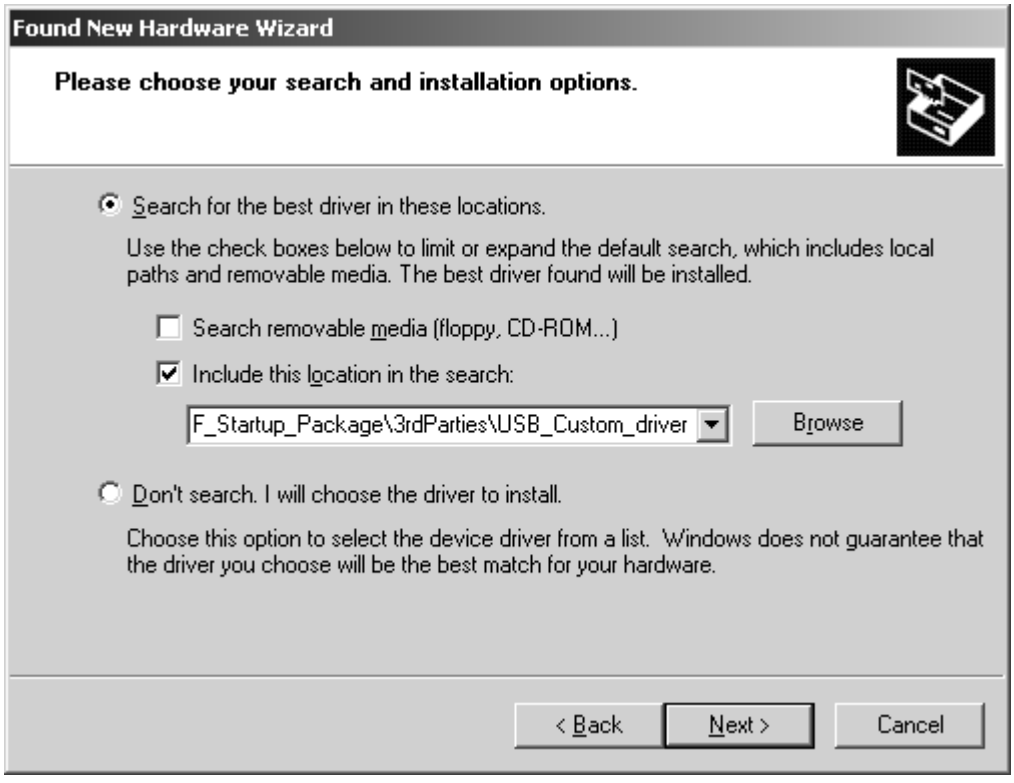
- **IQRF IDE:** integrated development environment to create and debug IQRF applications (MICRORISC)
- **USB Custom driver:** USB driver (Microchip, MICRORISC VID / PID)
- **CC5X:** C compiler for the PIC microcontrollers (B Knudsen Data)
- **Text editor:** for source texts creations. Any external editor beeing able to save a plain ASCII text, e.g. Windows Notepad can be used. Notepad++ is recommended.

## Installation

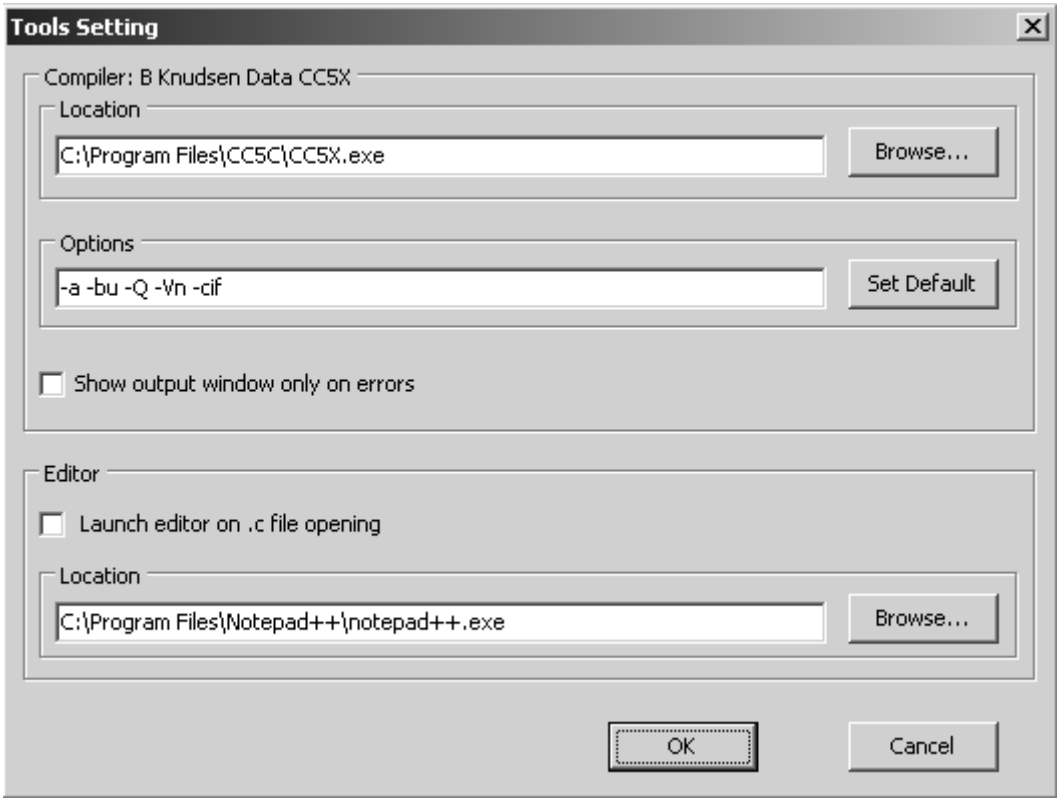
1. The **Startup Package** is available on the IQRF CD and can be downloaded from www.iqrf.com/downloads.
2. **Invoke** this selfextracting archive Startup Package `(.exe)`. All you need is automatically installed (including the free edition of the C compiler for non-commercial purposes) to specified directory.
3. **Connect** the development kit to PC. Windows detect a new USB device and ask about the **driver location**. Navigate to the `USB_Custom_driver` subdirectory. Windows administrator rights may be required for this step.

Example for Windows XP:


Found New Hardware Wizard
This wizard helps you install software for:
IQRF USB Device
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

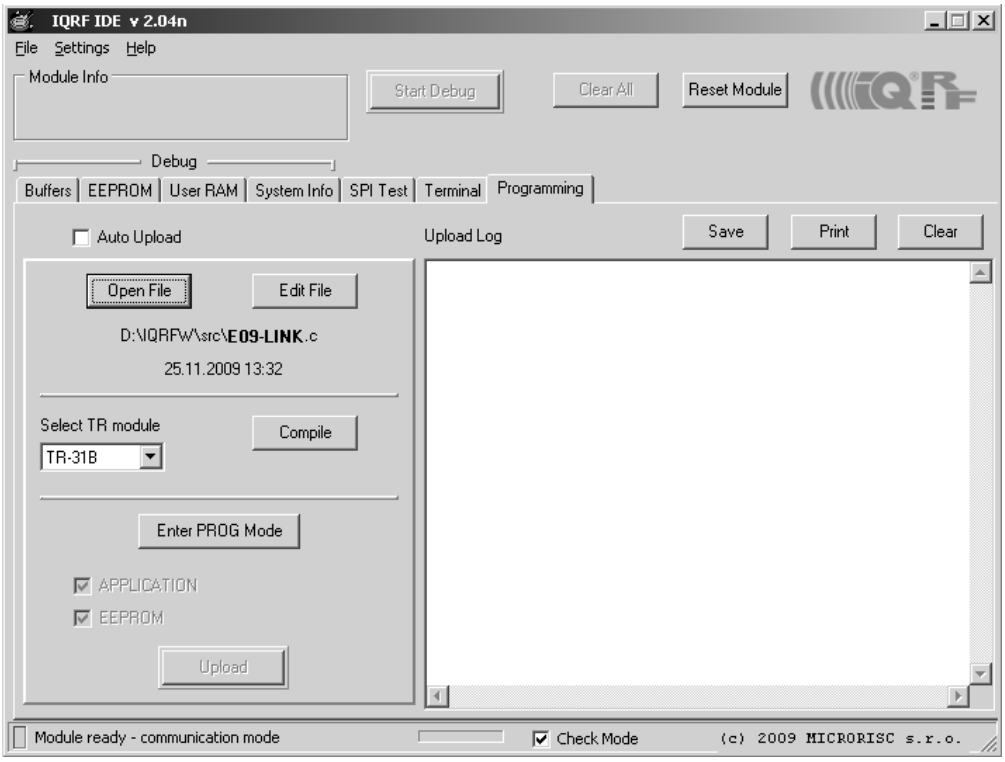

Found New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM...)
Include this location in the search:
F_Startup_Package\3rdParties\USB_Custom_driver
Browse
Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back
Next >
Cancel


4. **Invoke** the **IQRF IDE**.
5. Set the **path to the editor** in the *Settings / Tools Setting* menu:




**Tip:** Notepad++ (GPL, a part of the Package) is very suitable editor. **Install** it by invoking the Installer (the `.EXE` file) in the **Notepad++** directory.

**TR type** has to be selected just for compilation (after opening a C source file) by select (drop-down) list.




## Test

Check conection between the development kit and PC: click the IQRF logo in IQRF IDE window. The LED1 on the kit should flash thrice.

TR modules are programmed from the factory with the `E09-LINK` sample program. After power supply is connected to the development kit successful run-up is indicated by flashing of green LED on the TR.

TR modules with `E09-LINK` are ready for RF range test. Red LEDs on the modules flash if the modules are in range each other. By increasing the distance out of range flashes are switched from red to green. Connection can be reestablished by bringing closer again. See comments in `E09-LINK`.

## Operation

The Startup Package contains a series of examples in the `src` directory and subdirectories. See IQRF IDE Help for handling development environment.

1. **Using a ready-made example** (without modifications): Upload a `.HEX` file into the TR module plugged in the development kit by the *Programming* tab in the IQRF IDE environment.
2. **Using an example with possible modification:** Edit the source program (a `.C` file) and compile it from the C language to the `.HEX` format also in the *Programming* tab in the IQRF IDE environment. Then continue according the case 1 above.
3. **Creation of a new program**: It is recommended to start from the empty template `E00-START.c`. The user creates a complete program by themselves in this case. Continue similarly as in case 2 above.

**To complete an IQRF design, proceed as follows:**

1. Plug the TR into the development kit.
2. If you do not intend to modify or display a source code but to program an existing code only, open required `.HEX` file by the *Open file* button and go to step 7.
3. Open required source file – e.g. some of examples from the Startup Package – (e.g. `E09-LINK.c`) or empty template `E00-START.c` by the *Open file* button.
4. Select the TR module type used.
5. Make possible modifications and save them then (in the text editor).
6. Compile the program by the *Compile* button. If any error is reported by the compiler, go to step 5 to correct it. The result is a compiled code in the `.HEX` format.
7. Switch the module to the programming mode by the *Enter PROG Mode* button.
8. Program the code into the module by the *Upload* button.
9. After uploading the application is just invoked. It is possible to debug it by the IQRF IDE (the *Debug* tab).
10. Then the module can be moved e.g. to another development kit or to an end user equipment.

    ***Caution:*** *The TR module can be plugged / unplugged into / from the SIM connector while powered off only.*
    ***Tip:*** *In case of CK-USB-04 the SW2 pushbutton can be used for this. The TR module is not powered while the SW2 pushbutton is held.*

Then, repeat steps 3 to 9 as you need.

See IQRF IDE *Help* for details. E.g. steps 7 and 8 can be performed in one stroke by the F5 key.
Typical repeated procedure is:

- Edit external editor
- Save (Ctrl+S) external editor
- Compile (F10) IQRF IDE – the *Programming* tab
- Upload (F5) IQRF IDE – the *Programming* tab
- Debug IQRF IDE – the *Debug* and *Communication* tabs

**Note:** The IQRF IDE detects a TR module only if it has the SPI communication activated which depends on the application just running in the module. Otherwise IDE issues the *SPI not active* message. SPI communication can be established by entering the programming mode in the IDE. The application in the TR module is not running in the programming mode.

## Troubleshooting

### For CK-USB-02

Firmware version of the CK kit, the USB driver version and the IQRF IDE version must be in accordance each other (marked with **+** in the table):

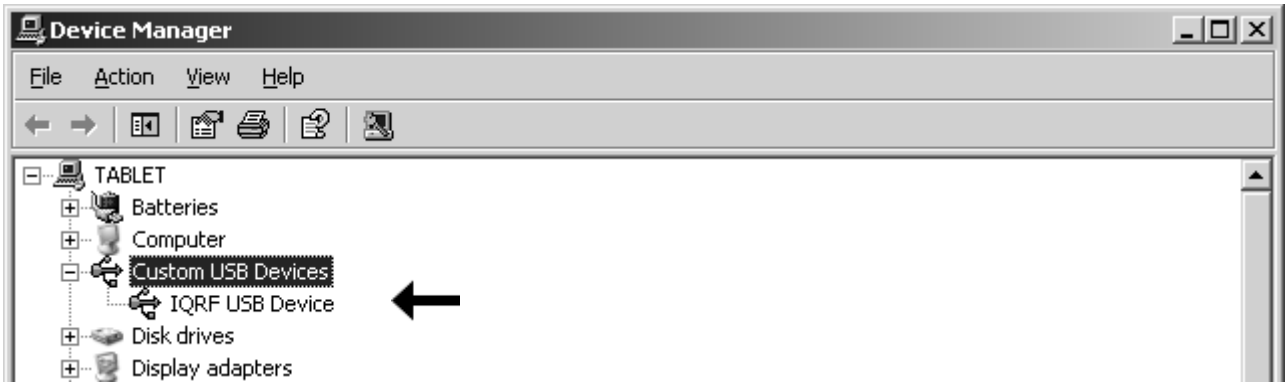
| | **CK-USB-02** | | **USB driver** |
|---|---|---|---|
| | **FW 1.x** (obsolete) | **FW 2.xx** | |
| **IQRF IDE v1.0x** (obsolete) | **+** | – | **V2.3** (Microchip PICDEM FS... device) |
| **IQRF IDE v2.xx** | – | **+** | **V1.0** (IQRF USB device) |

Advanced: CK-USB-02 (FW v2.00 or higher), USB driver v1.0 and IQRF IDE v2.00 or higher.
Obsolete but functional for older TR types: CK-USB-02 (FW 1.x), USB driver v2.3 and IQRF IDE v1.0x (1.05 recommended).

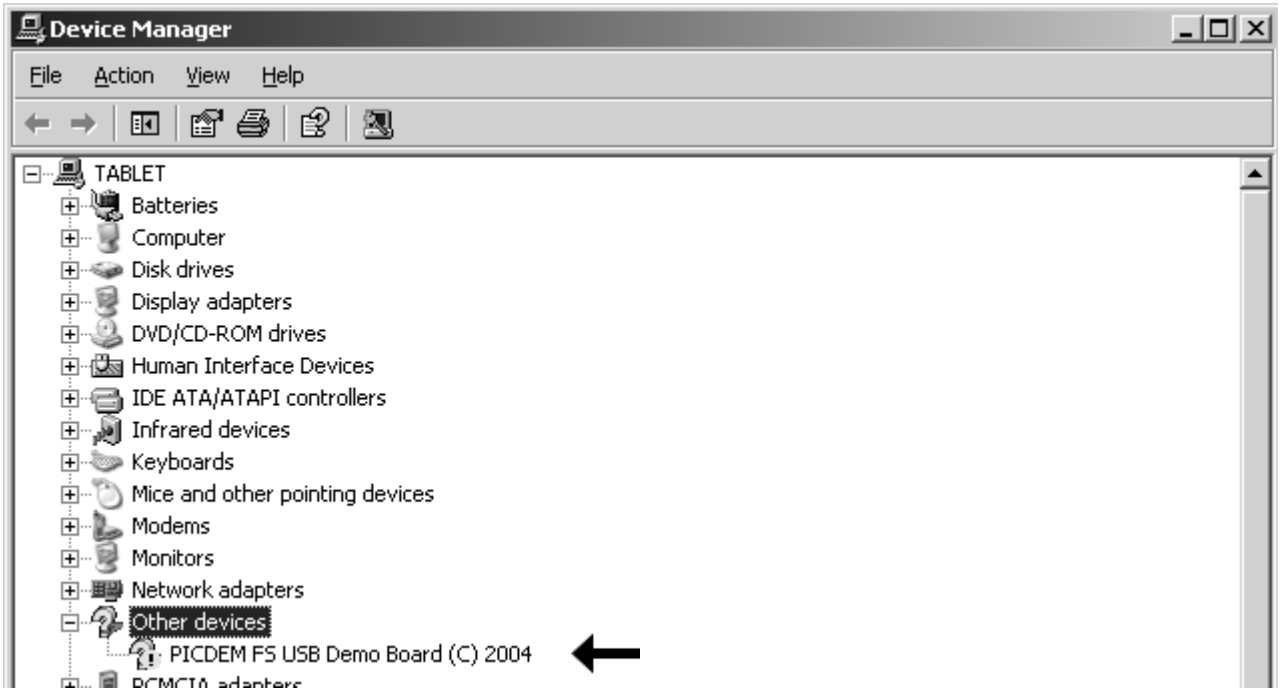
CK-USB-02 firmware can be upgraded by the manufacturer and (from version FW 2.00) even by the user themselves.

### Driver checking

Properly installed driver v1.0 is displayed as follows:




Improperly installed driver can be displayed e.g. as follows:




See Control Panel / System / Hardware / Device Manager.

### Windows Vista

Under the Windows Vista (either 32 b or 64 b) the IQRF IDE should be invoked in the Windows XP (Service Pack 2) compatibility mode to ensure proper USB driver functionality.

1. Click the right mouse button on the IQRF IDE icon on the Windows desktop or on the `iqrf_ide.exe` file.
2. Select item: *Properties*
3. Select item: *Compatibility*
4. Check the box: *Run this program in compatibility mode for:*
5. Select *Windows XP (Service Pack 2)* in the selection
6. Click: *O.K.*

### Windows 7

There are no significant differences.

## Document history

- 110107 Updated for OS v3.00, CK-USB-04 and Windows 7
- 100705 Just cosmetic improvements
- 091201 Modified for IQRF OS v2.10
- 090907 Modified for IQRF IDE v2.01
- 081218 First release

# Sales and Service

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