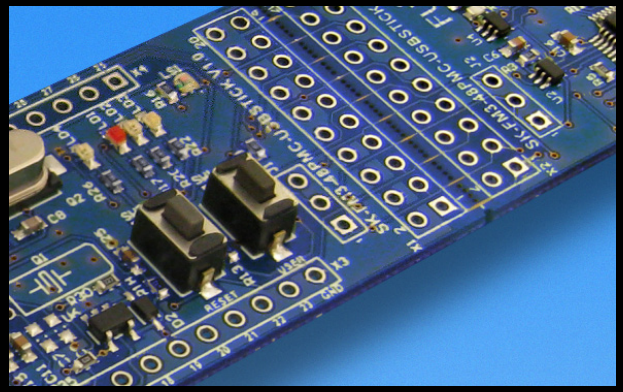
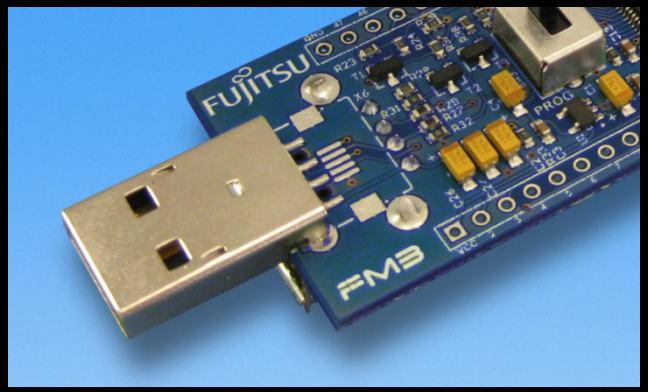
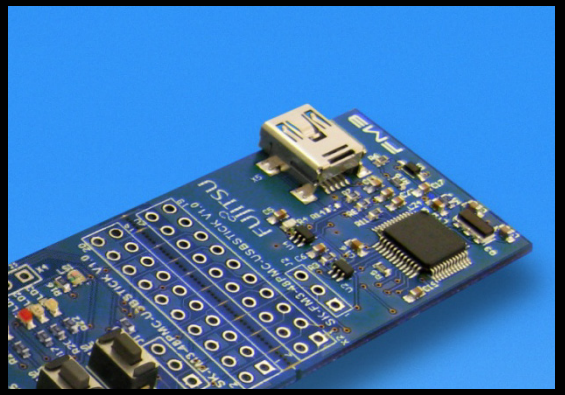
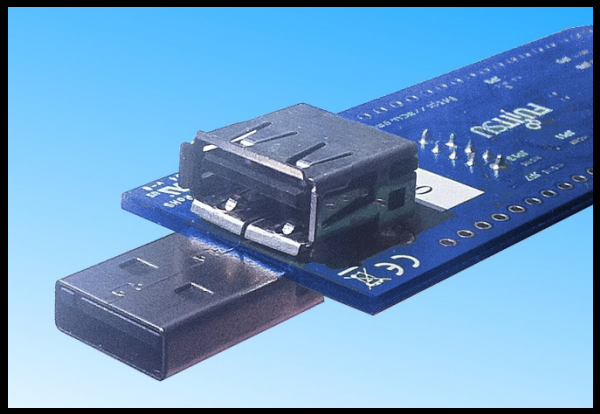
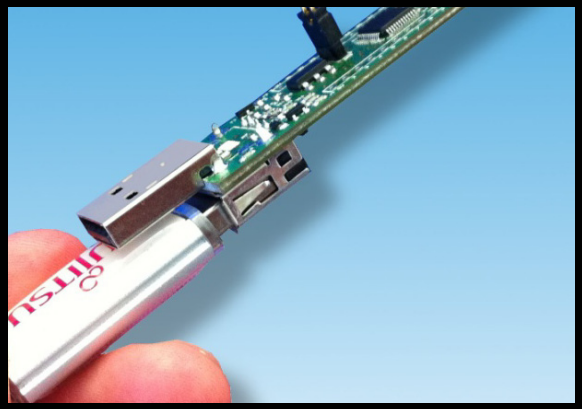
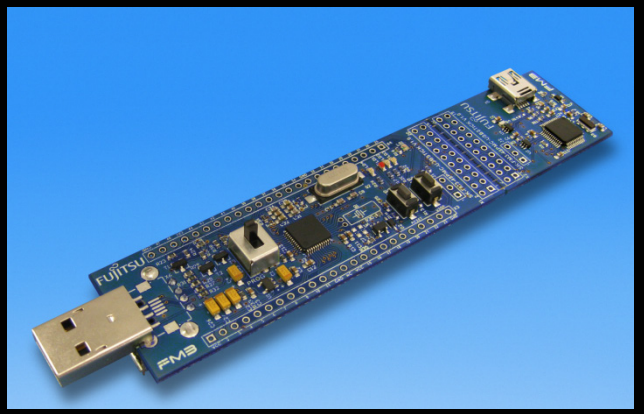
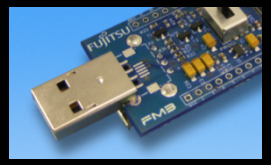
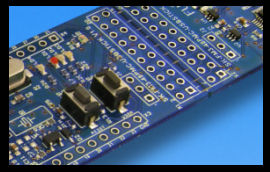
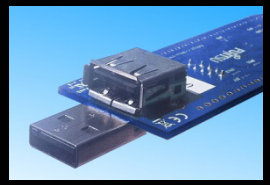
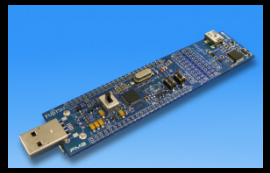
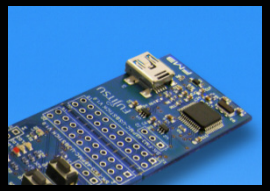




FUJITSU

SK-FM3-48PMC-USBSTICK
Quick Start

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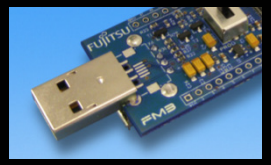
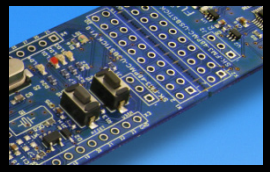
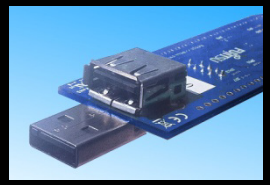
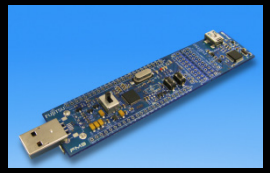
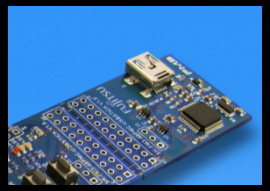
Information

Note:

For viewing PDFs on this CDROM / softwarepackage "PDF XChange Viewer" is included. PDF XChange is used as PDF viewer to support hyperlinks to content located at CDROM or this softwarepackage.

PDF XChange Viewer is free of charge and can be downloaded at the website of the manufacturer "Tracker Software":

http://www.tracker-software.com/product/pdf-xchange-viewer

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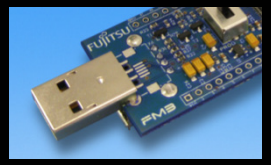
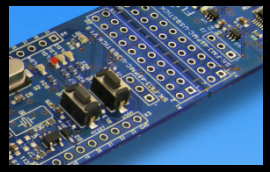
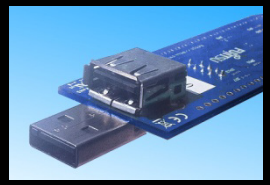
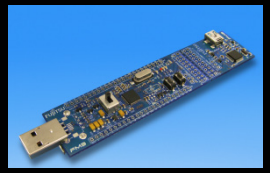
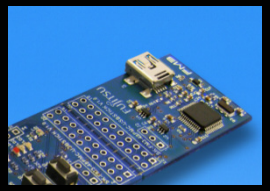
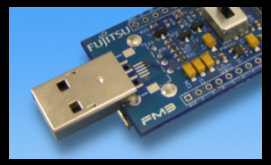
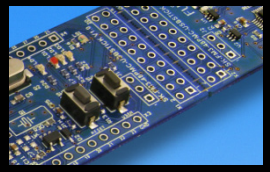
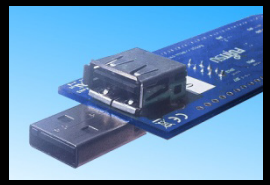
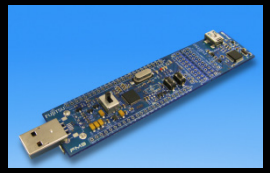
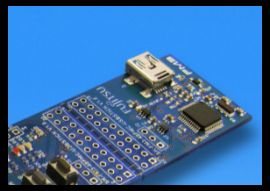
http://www.tracker-software.com

CD Contents

- **Software (Installation)**
  - FLASH USB DIRECT Programmer (utilities\programmer_usb\setup.exe)
  - FLASH Serial Programmer (utilities\programmer_uart\setup.exe)
  - SerialPortViewerAndTerminal (utilities\serial_port_viewer\setup.exe)
  - Fujitsu OpenOCD Starter (GUI) (utilities\openocd_starter\setup.exe)
  - **Fujitsu USB Wizard** **download via http://emea.fujitsu.com/fm3**
- **Documents**
  - Schematic: 'SK-FM3-48PMC-USBSTICK'
  - User Guide: 'SK-FM3-48PMC-USBSTICK'
  - Data Sheet: MB9A310K Series
  - Manual: Peripheral Manual
  - Manual: Technical Reference Manual
  - Manual: Flash Programming Manual
  - Application Note: Virtual Com Port; Example Files: Virtual Com Port
  - Application Note: FSEU USB Host
  - Application Note: FujitsuUsbLib (PC)
  - Application Note: FSEU Embedded USB Device Library
  - Application Note: OpenOCD GUI Frontend
  - Application Note: USB Host Mass Storage Bootloader; Example Files: Firmware
  - Doxygen Documentation USB

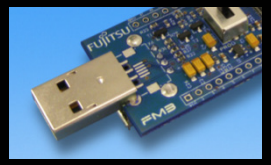
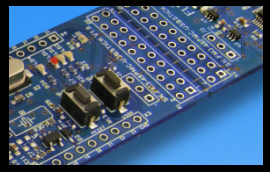
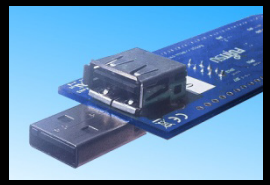
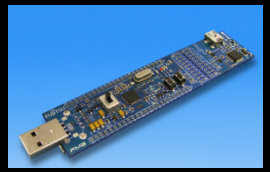
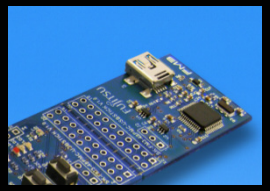
CD Contents (continued)

- **Examples**
  - Host / Device switchable: Host: Mass Storage, Keyboard, Mouse; Device: LibUSB
    sk-fm3-48pmc-usbstick_usb_device_libusb_communication-v12 Driver / Win-Exe / Firmware
  - Host / Device switchable: Host: Mass Storage, Keyboard, Mouse; Device: Virtual Com Port
    sk-fm3-48pmc-usbstick_usb_device_virtual_com_port-v12 Driver / Firmware
  - Host / Device switchable: Host: Mass Storage, Keyboard, Mouse; Device: HID communication
    sk-fm3-48pmc-usbstick_usb_device_hid_communication-v12 Win-Exe / Firmware
  - USB Host Mass Storage Bootloader:
    sk-fm3-48pmc-usbstick_usb_host_massstorage_bootloader-v10 Firmware

default flashed

- **Compiled code can be found in subfolder *example\IAR\output\release\exe***
- **Please copy examples folder on CD to harddrive before using them!**
- **Click here to start installation of contents from CD to hard drive**
- **Have a look for the latest version: http://emea.fujitsu.com/fm3**

CD Contents (continued)

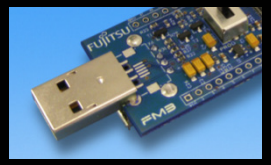
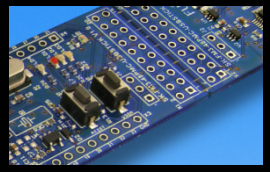
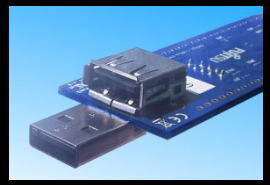
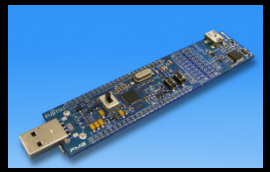
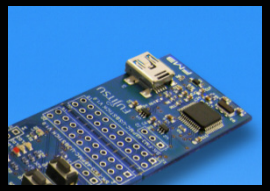
Download the latest version from the following website

http://emea.fujitsu.com/fm3

Direct Tool URL:

http://mcu.emea.fujitsu.com/mcu_tool/detail/SK-FM3-48PMC-USBSTICK.htm

Overview

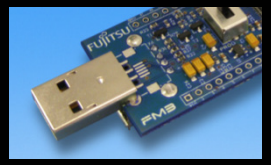
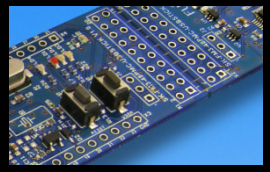
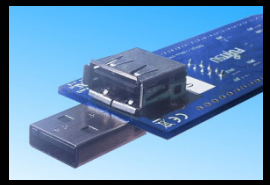
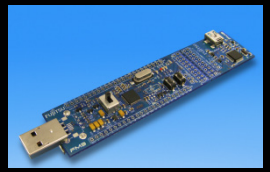
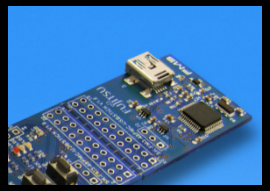






- **Introduction**
  - About the SK-FM3-48PMC-USBSTICK
  - Requirements
  - The hardware
  - Installation of Serial Port Viewer & Terminal
  - Installation of USB drivers
- **Try yourself**
  - MCU Programming via USB
  - USB Host and Device
  - Debugging
  - IAR-Embedded Workbench
  - Keil µVision

NEW **Create Own USB Applications using Fujitsu USB Wizard**

- **Contacts**

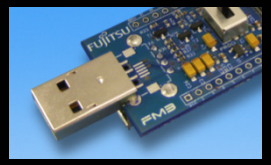
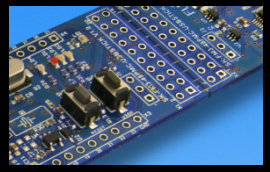
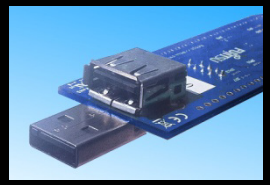
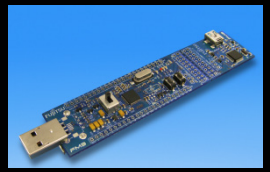
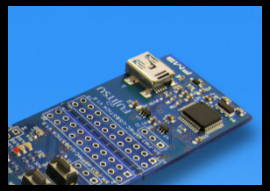
About the SK-FM3-48PMC-USBSTICK

- **The SK-FM3-48PMC-USBSTICK includes a low-cost evaluation board based on the Fujitsu FM3 microcontroller MB9A310k Series**

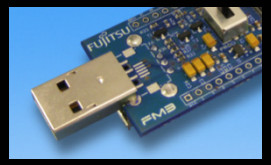
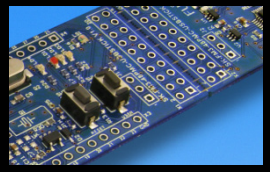
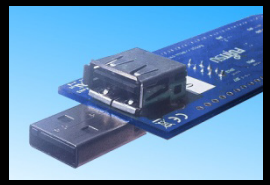
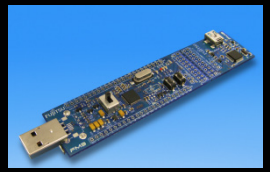
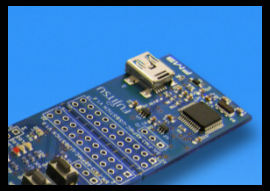
- **The MB9A310K Series includes the following features:**
  - Up to 128 KByte Flash Memory
  - Up to 16 KByte RAM
  - Up to 4 LIN-USART-I²C interfaces
  - USB-Host/-Device interface
  - Timers (ICUs, OCUs, PPGs, others)
  - Up to three 12 bit ADC
  - External interrupts
  - Low Power Mode
  - DMA Controller (8 channels)
  - Quadrature Position/Revolution Counter

About the SK-FM3-48PMC-USBSTICK

Features of the SK-FM3-48PMC-USBSTICK board:

- Microcontroller MB9AF312K
- 1x USB to serial converter (Type-B connector)
- JTAG integrated
- 1x USB-MiniHost (Type-A connector)
- 1x USB-Device (Type-B connector)
- Optional USB On-The-Go (assembly option for USB Mini connector)
- 3x LED controlled with PWM
- 1x ‘User’-button
- 1x ‘Reset’-button
- All 48 pins routed to pin-header
- Power supply via USB
- Voltage filter for ADC
- Light sensor

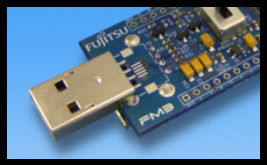
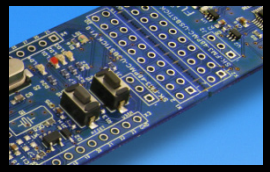
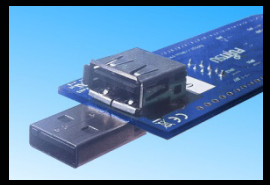
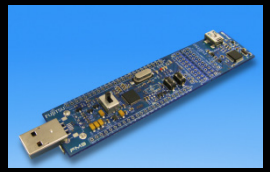
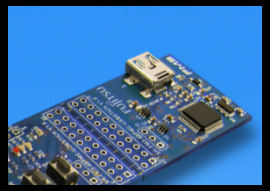






Requirements

- **Embedded Development & MCU Flash Programming**
  - Windows 2000 , Windows XP or Windows7
  - Administrator Rights
  - For some applications .NET Framework 2.0 and higher is required
- **PC Frontend Development**
  - Microsoft Visual C# Express
  - Microsoft .NET Framework 2.0 and higher
- **Virtual Com Port Example**
  - Windows 2000,XP, Vista or Windows 7 (32-bit)
  - Mac OS X or Linux
- **HID Communication Example**
  - Windows 2000,XP, Vista or Windows 7 (32- and 64-bit)
  - Microsoft .NET Framework 3.5 and higher

The Hardware

Top side

USB-Connector (X6)

USB A/B conector

Run/Prog Switch

To switch between USB programming mode and run mode

FM3 MB9AF312K Series MCU

MB9AF312K

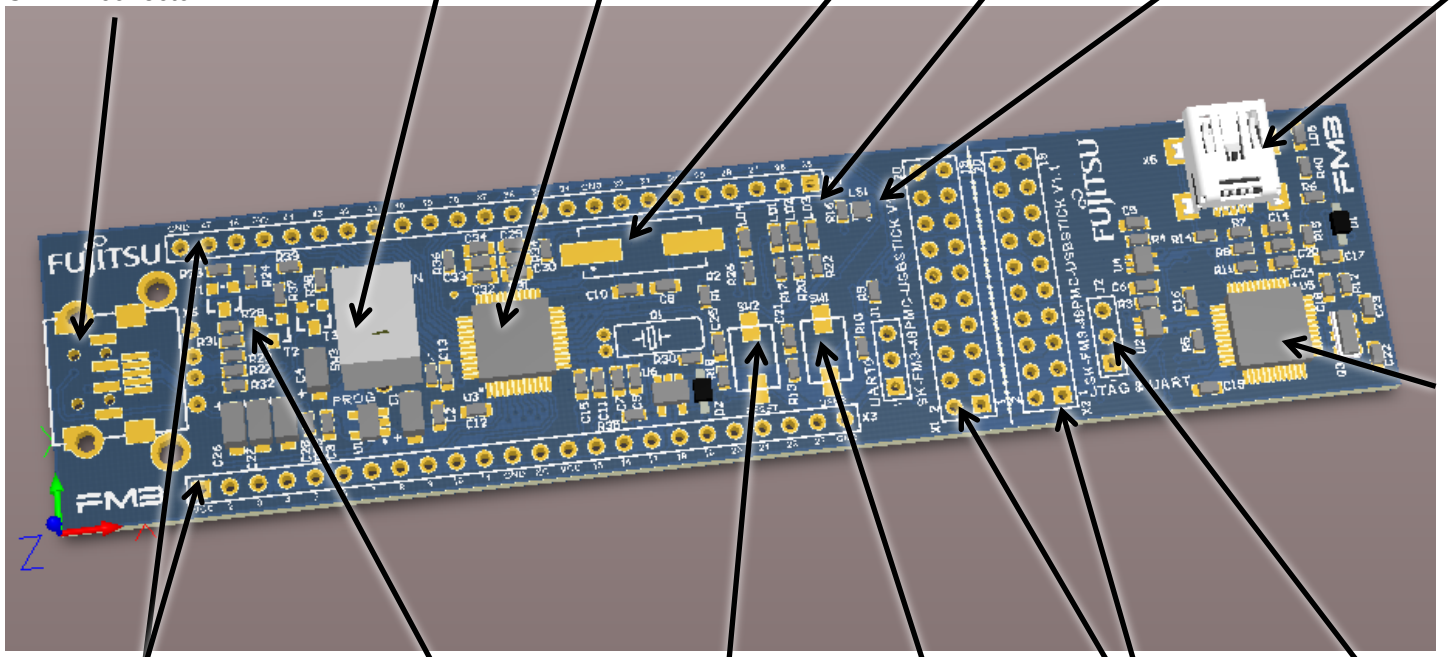
4MHz Oszillator

RGB LED

Light Sensor

JTAG USB (X5)

Debug



JTAG Chip

Pin Headers

Connect free MCU Pins with own peripherals

Voltage Regulator

For internal 3,3V

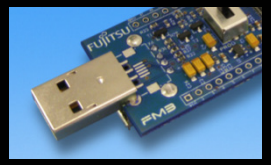
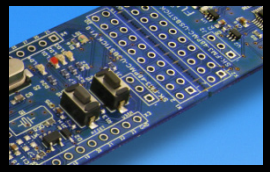
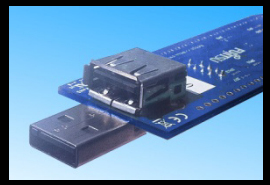
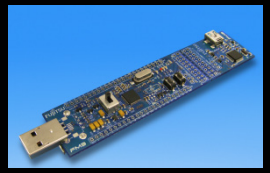
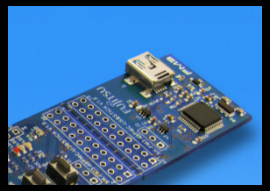
Reset button

User Button

Pin Headers for UART

Pin Headers for JTAG

The Hardware

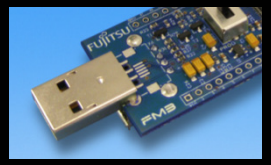
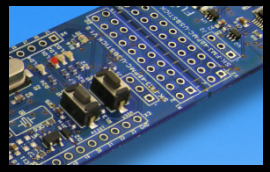
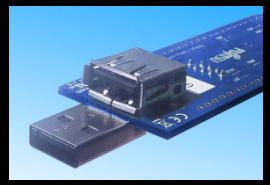
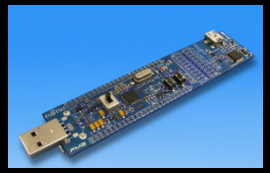
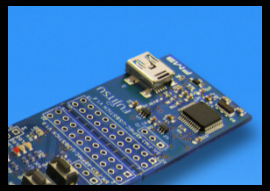






- The microcontroller pins

Pin	Pin-name	Pin-Function on SK-FM-100PMC
1	VCC	VCC
2	P50/ INT00_0/AIN0_2/ SIN3_1	
3	P51/INT01_0/BIN0_2/SOT3_1	
4	P52/INT02_0/ZIN0_2/SCK3_1	
5	P39/DTTI0X_0/ADTG_2	
6	P3A/RTO00_0/TIOA0_1/RTCCO_2/SUBOUT_2	R-RGB LED
7	P3B/RTO01_0/TIOA1_1	
8	P3C /RTO02_0 /TIOA2_1	G-RGB LED
9	P3D/ RTO03_0/ TIOA3_1	
10	P3E/ RTO04_0/ TIOA4_1	B-RGB LED
11	P3F/ RTO05_0/ TIOA5_1	
12	VSS	GND

Pin	Pin-name	Pin-Function on SK-FM-100PMC
13	C	N.C.
14	VCC	VCC
15	P46/ X0A	32KHz Crystal
16	P47/ X1A	32KHz Crystal
17	INITX	Reset
18	P49/ TIOB0_0	
19	P4A/ TIOB1_0	
20	PE0/ MD1	
21	MD0	SW3 Run Mode
22	PE2 X0	4MHz Crystal
23	PE3 X1	4MHz Crystal
24	VSS	GND

The Hardware

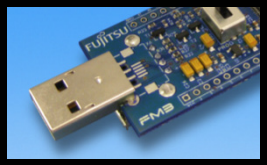
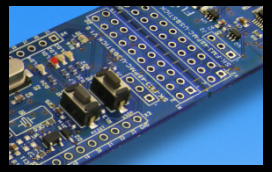
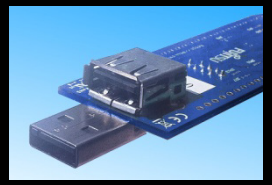
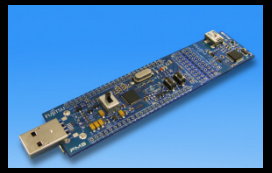
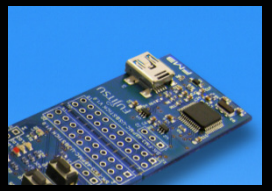
- The microcontroller pins (continued)

Pin	Pin-name	Pin-Function on SK-FM-100PMC
25	P10/ AN00	Fotoresistor LDR 03
26	P11/ AN01/SIN1_1 /INT02_1/ FRCK0_2/ IC02_0/ WKUP1	USB Overcurrent
27	P12/ AN02/ SOT1_1/ IC00_2	USB HOST Pull-Down
28	P13/ AN03/ SCK1_1/ IC01_2/ RTCCO_1/ SUBOUT_1	USB VBUS EN
29	P14/ AN04/ SIN0_1/ INT03_1/ IC02_2	
30	P15/ AN05/ SOT0_1/ IC03_2	USB ID
31	AVCC	VCC
32	AVRH	VCC
33	AVSS	GND
34	P23/ AN06/ SCK0_0/ TIOA7_1	
35	P22 / AN07 / SOT0_0 / TIOB7_1	UART0 (TXD)
36	P21 / SIN0_0 / INT06_1 / WKUP2	UART0 (RXD)

Pin	Pin-name	Pin-Function on SK-FM-100PMC
37	P00/ TRSTX	TRSTX
38	P01 /TCK / SWCLK	TCK
39	P02 /TDI	TDI
40	P03 / TMS / SWDIO	TMS
41	P04 /TDO /SWO	TDO
42	P0F/ NMIX / CROUT_1 / RTCCO_0 /SUBOUT_0 / WKUP0	SW2 Switch
43	P61 / SOT5_0 / TIOB2_2 / UHCONX /DTTI0X_2	UHCONX
44	P60 / SIN5_0/ TIOA2_2 / INT15_1/ IC00_0/ WKUP3	USB VBUS INT
45	USBVCC	VCC
46	P80/ UDM0	UDM0
47	P81 /UDP0	UDP0
48	VSS	GND

The Hardware

The jumpers (bottom side)

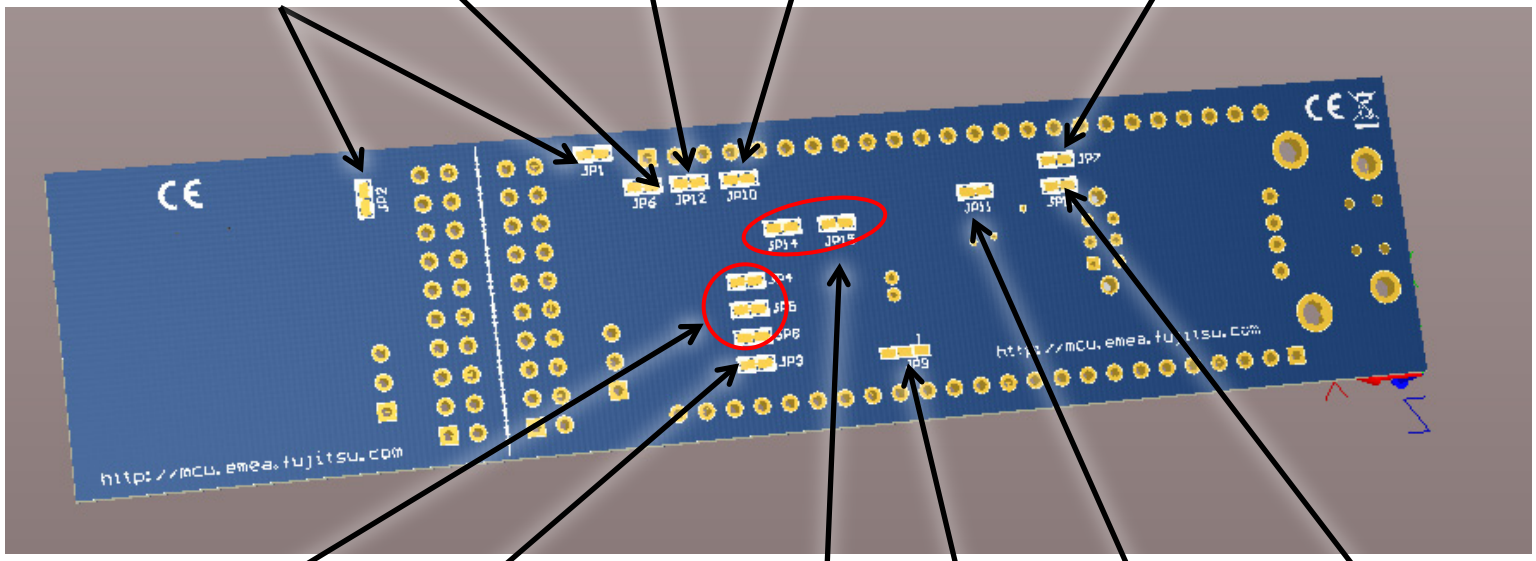
JP6: Light Sensor
Default:Closed

JP12: USB Overcurrent
Default:Closed

JP10: USB BUS Enable
Default:Closed

JP7: USB ID-Pin
Default:Closed

JP1- JP2: JTAGPWR
Default:Closed



JP4, JP5, JP8: RGB LEDs
Default:Closed

JP14-JP15: Use 32KHz Quartz
Default:Open

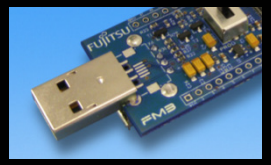
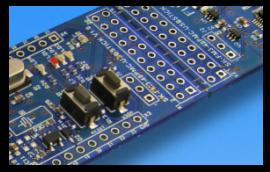
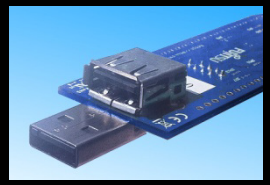
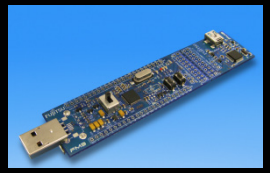
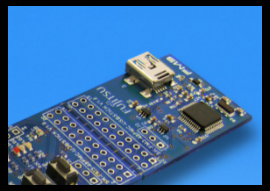
JP13: USB Host Low
Default:closed

JP11: AVRH Enable
Default:Closed

JP3: Use SW1
Default:Closed

JP9: USB BUS low/high
Default:2-3

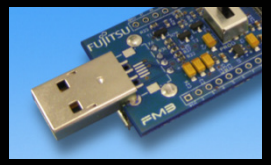
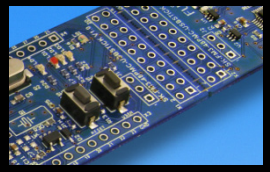
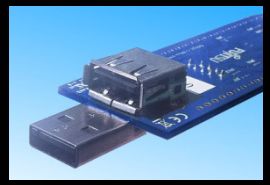
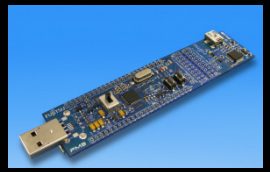
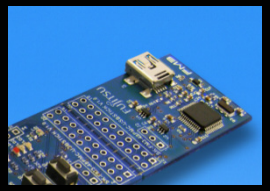
The Hardware

- The Jumpers

Jumper	Function	Default
JP1	JTAGPWR	Closed
JP2	JTAGPWR	Closed
JP3	Use SW1	Closed
JP4	RGB LEDs	Closed
JP5	RGB LEDs	Closed
JP6	Light sensor	Closed
JP7	USB ID Pin	Closed
JP8	RGB LEDs	Closed
JP9	USB BUS low/high	2-3
JP10	USB BUS enable	Closed
JP11	AVRH Enable	Closed
JP12	USB Overcurrent	Closed
JP13	USB Host	Closed
JP14	Use 32KHz Crystal	Open
JP15	Use 32KHz Crystal	Open

The Hardware

3.3 User RGB LED (LD1, LD2, LD3)

As visual output interface three RGB LEDs are placed on the evaluation board. They can be driven via port pin P3A (port 3, bit 10), P3C (port 3, bit 12) and P3E (port 3, bit 14). The used IO-Pins can be cut via Solder-Cut-Jumpers JP4, JP5 and JP8.

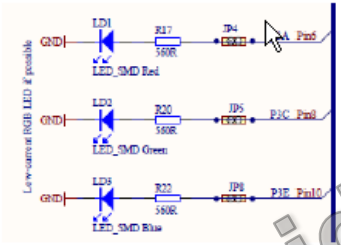


Figure 3-4: User RGB LED

3.3.1 User LED Routines

The user LED routines need the include file *board.h*. Before the user LED can be used, the `Board_Init()` must be executed. This is normally called in *main.c*.

The LEDs can be dimmed or used as normal GPIO. This can be set in *led.h* with:

```
#define LEDS_DIMMABLE 1
```

After the initialization, following functions are available from source code:

```
LED_ON(LED_RED);              // Red LED on
LED_ON(LED_GREEN);            // Green LED on
LED_ON(LED_BLUE);             // Blue LED on

LED_OFF(LED_RED);             // Red LED off
LED_OFF(LED_GREEN);           // Green LED off
LED_OFF(LED_BLUE);            // Blue LED off

/* usable if #define LEDS_DIMMABLE 1 in led.h */
LED_DUTY(LED_RED, 128);       // Set duty of red LED to 128(0…255)
LED_DUTY(LED_GREEN, 128);     // Set duty of green LED to 128(0…255)
LED_DUTY(LED_BLUE, 128);      // Set duty of blue LED to 128(0…255)
```

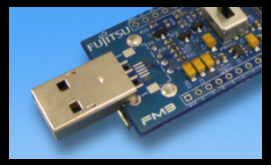
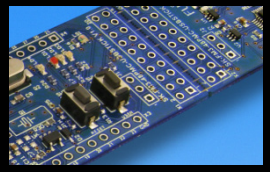
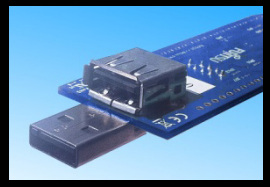
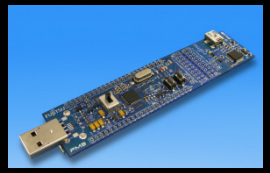
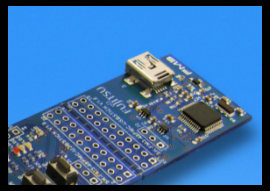
Figure 3-5: How to use the user RGB LEDs

Note:

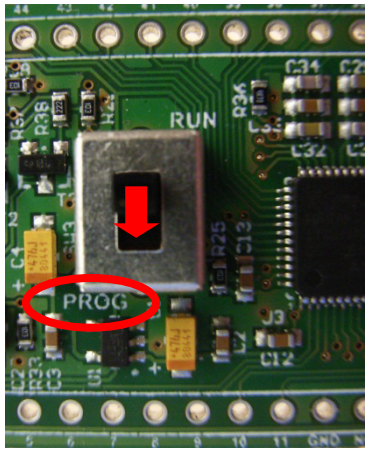
Have also a look into the tools user guide to have detailed information about hardware components and how to use it.

User Guide SK-FM3-48PMC-USBSTICK

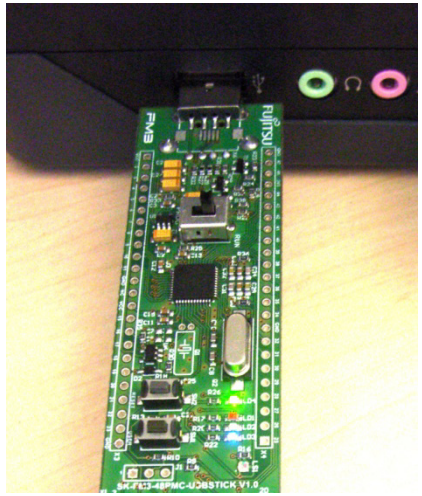
MCU Programming via USB

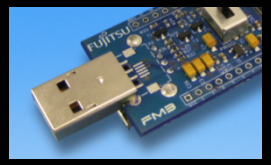
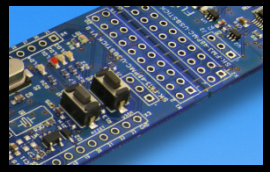
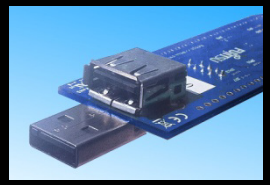
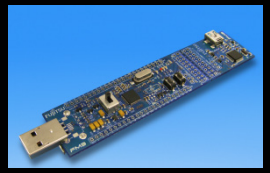
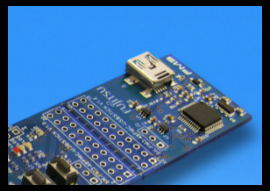
- **Step 1**
  - Insert the CD ROM
  - Switch SW3 to Prog Mode



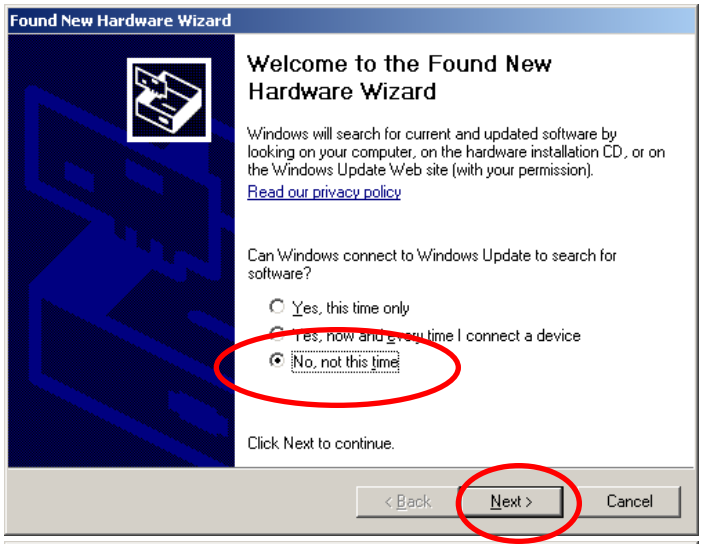
- **Step 2**
  - Connect the evaluation board to the PC

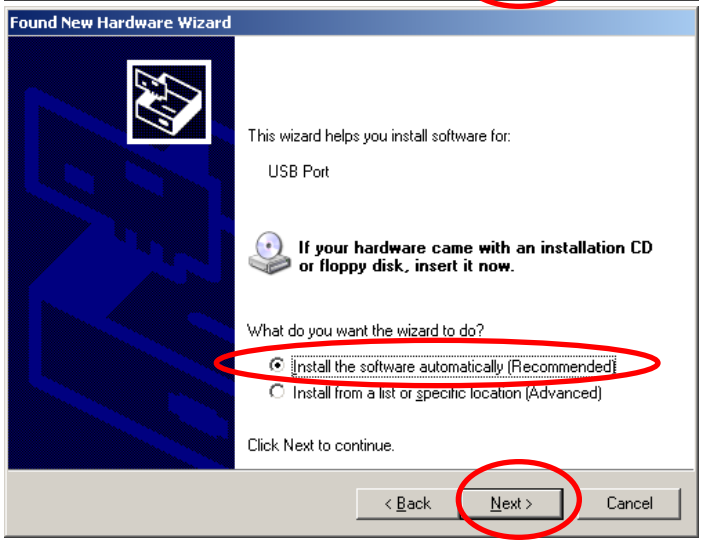


MCU Programming via USB

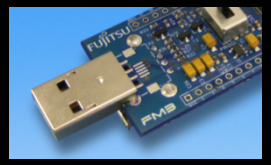
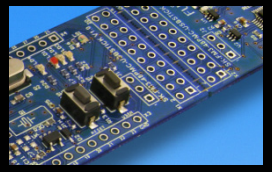
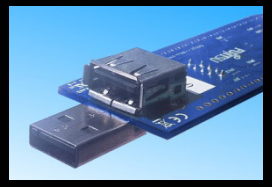
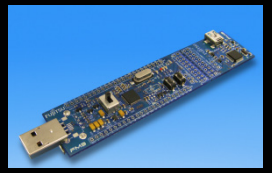
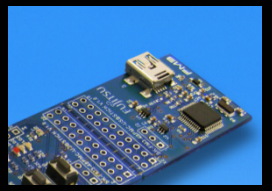






- **Step 3**
  - The hardware wizard will be opened.
  - Select "No, not this time" and click "Next"
  - Select "Install the software automatically (Recommended)" and click "Next"

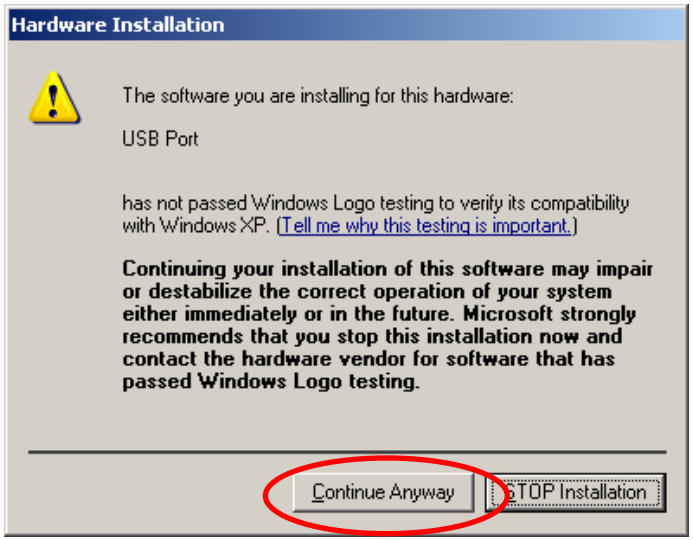


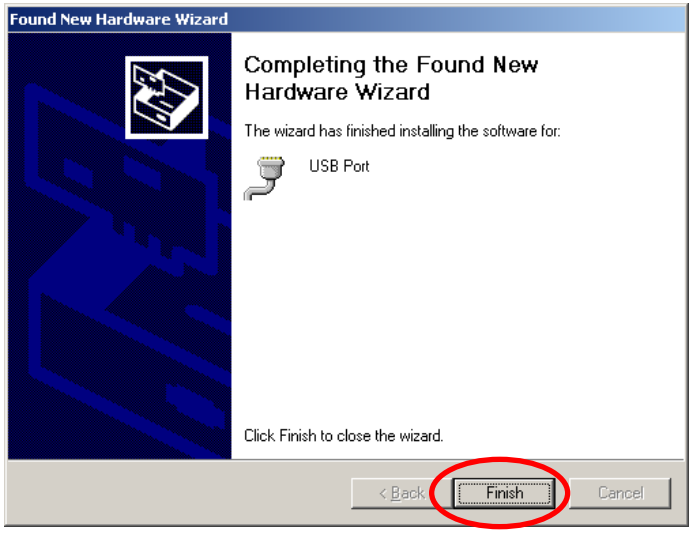


MCU Programming via USB

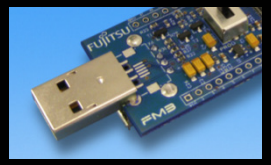
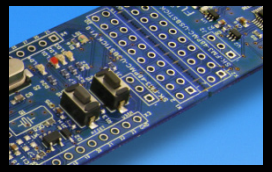
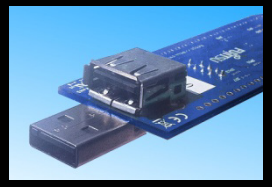
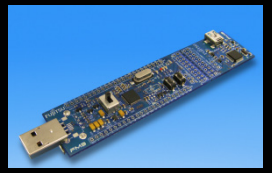
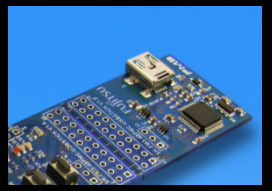






- **Step 3 (continued)**
  - While asking for Windows Logo certification, click "Continue Anyway"
  - The driver installation was successful.
- **Step 4**
  - Click finish

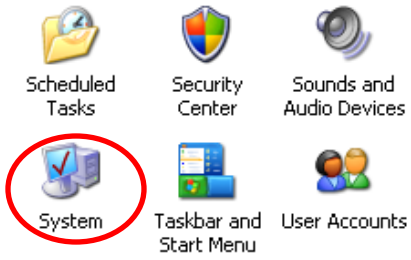




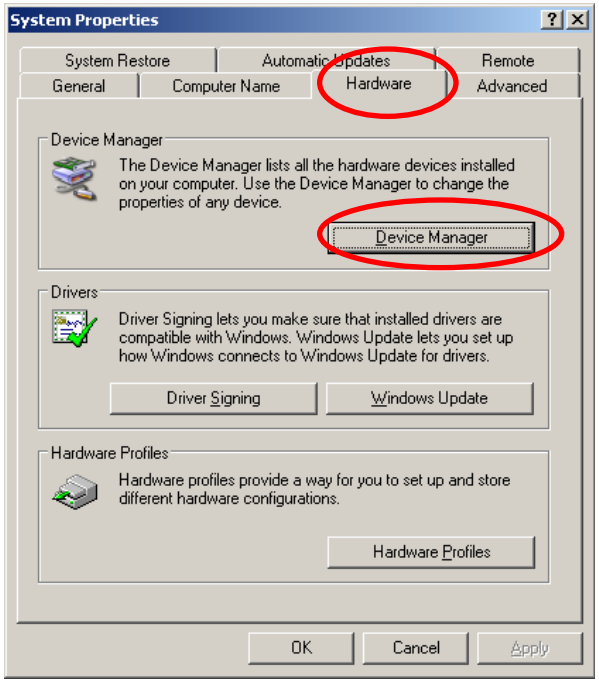
MCU Programming via USB

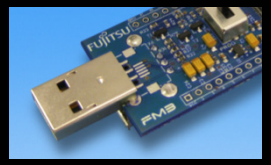
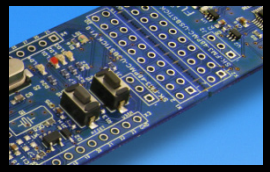
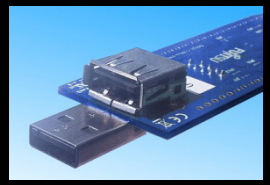
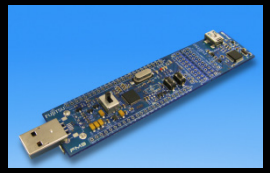
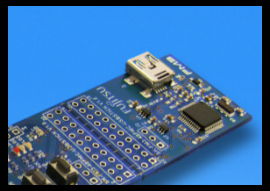
- **Step 5**
  - Find the virtual com port number via the device manager. It can be found in the "System" Control Panel.



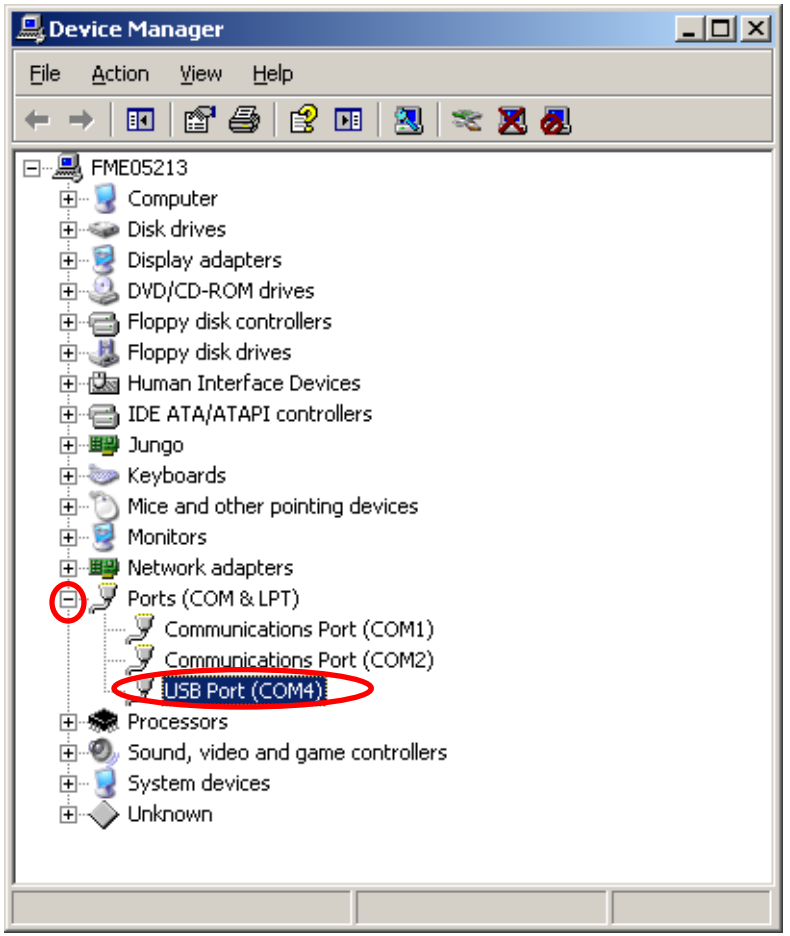
  - Select the "Hardware" and click at "Device Manager"



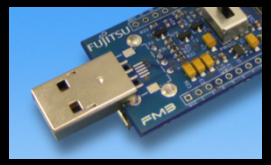
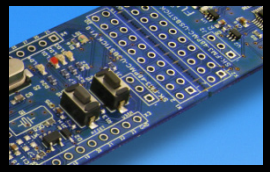
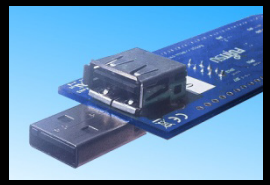
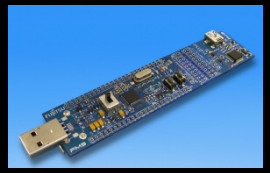
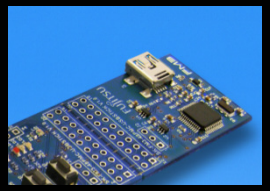
MCU Programming via USB

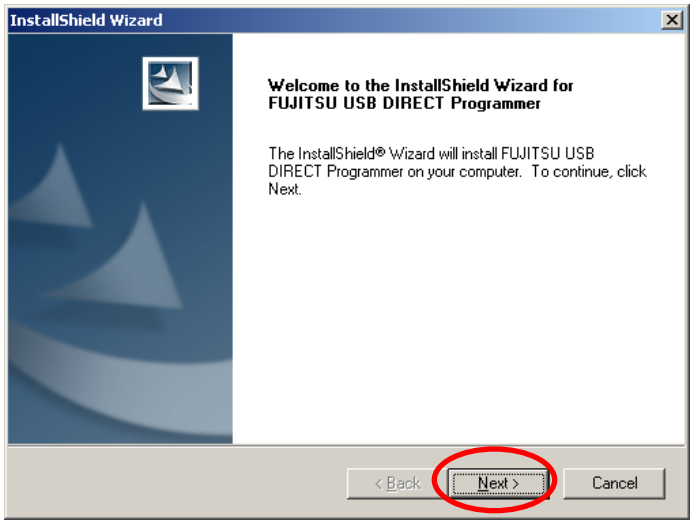
- **Step 5 (continued)**
  - Open the tree "Ports (COM & LPT" by clicking on the "+".
  - Look for the "USB Port" entry. In this case it is com port **4**

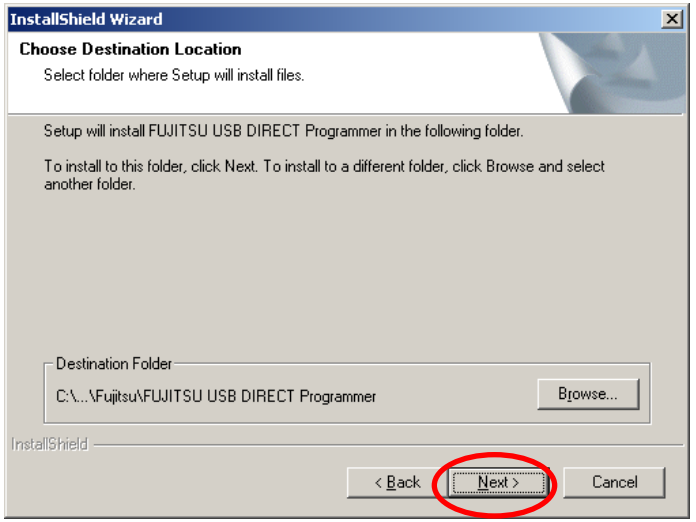


MCU Programming via USB

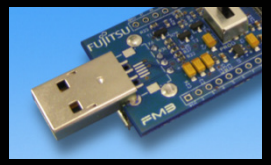
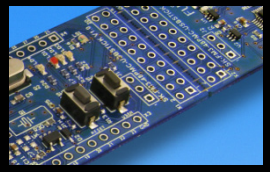
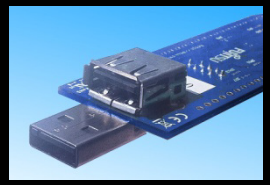
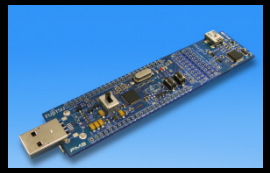
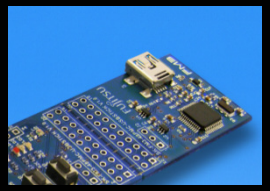






- **Step 5**
  - Start the installation
    (utilities\ programmer_usb\setup.exe)
    USB DIRECT Programmer
  - Click "Next"
  - Choose a optional installation directory and click "Next"

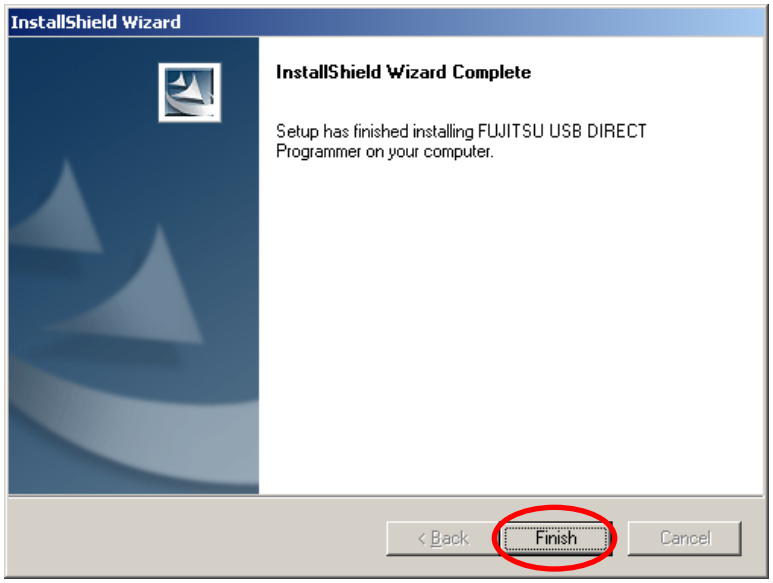




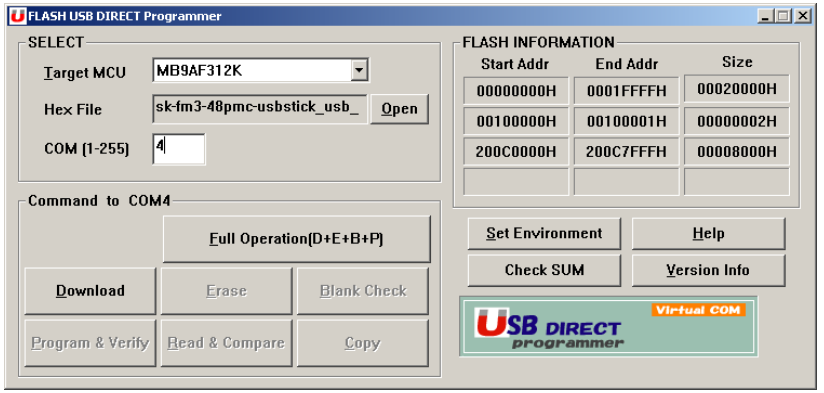
MCU Programming via USB

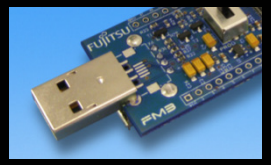
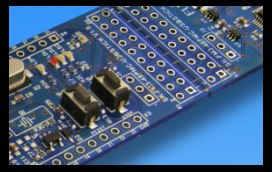
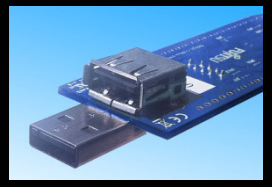
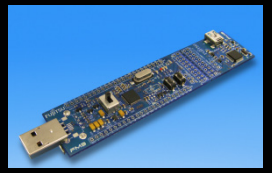
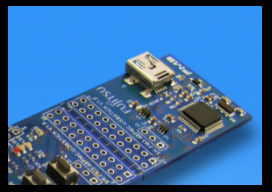
- **Step 5 (continued)**
  - The USB DIRECT Programmer was now succesfull installed.



- **Step 6**
  - Start the USB DIRECT Programmer from Start Menu



MCU Programming via USB

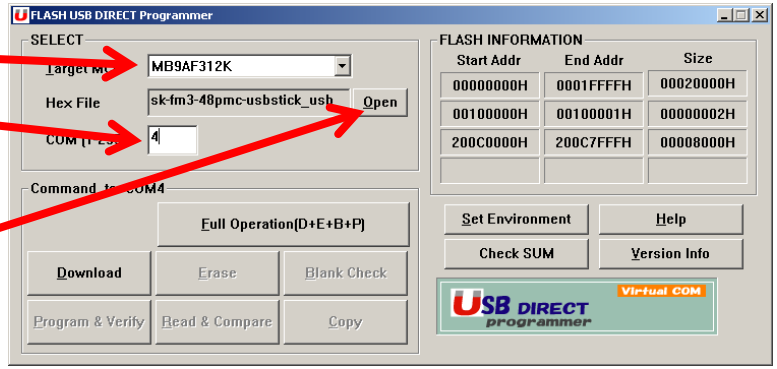






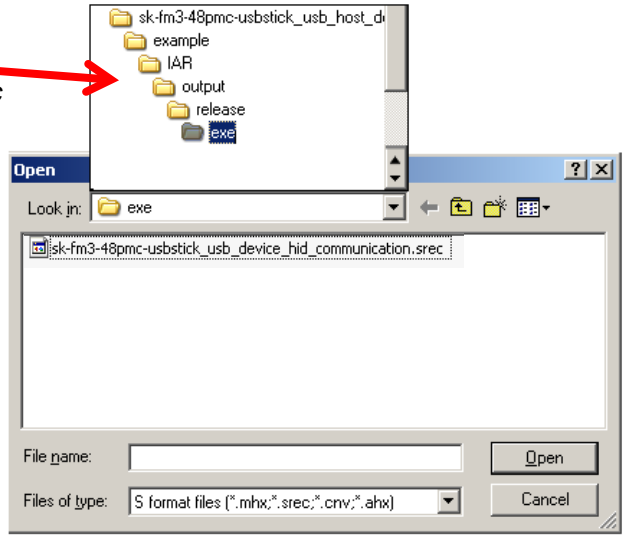
- **Step 7**
  - Choose Target MCU
  - Enter the com port number
  - Open the firmware file
    - Located in:

Examples
sk-fm3-48pmc-usbstick_usb_device_hid_communication
Example\IAR\output\release\exe

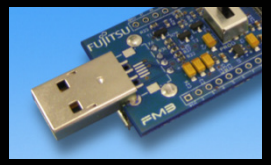
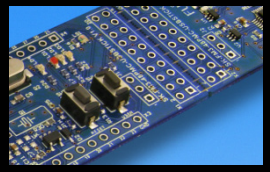
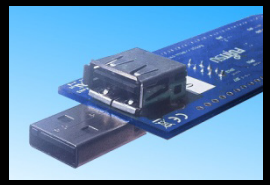
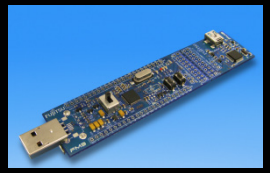
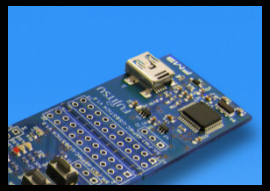
    - Choose here

sk-fm3-48pmc-usbstick_usb_device_hid_communication.srec

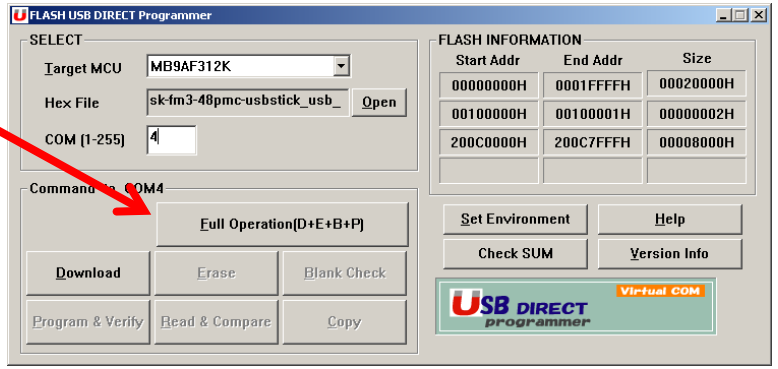




MCU Programming via USB

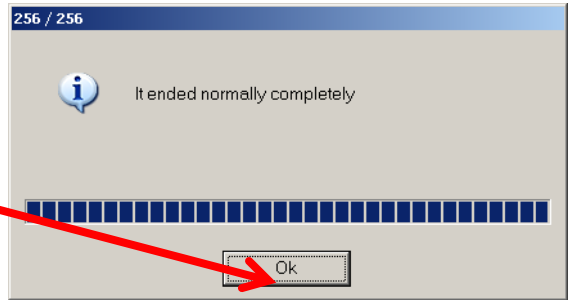






- **Step 7 (continued)**
  - Click at "Full Operation"

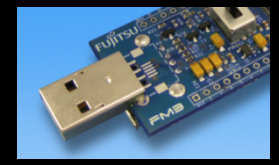
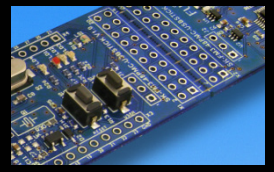
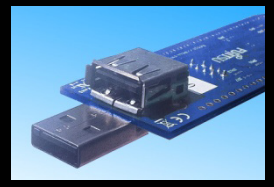
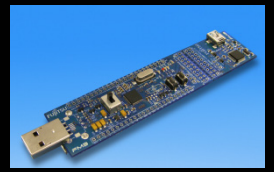
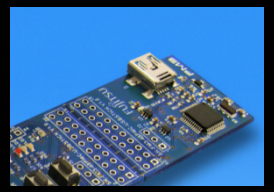


  - Reset the MCU and click at "OK"

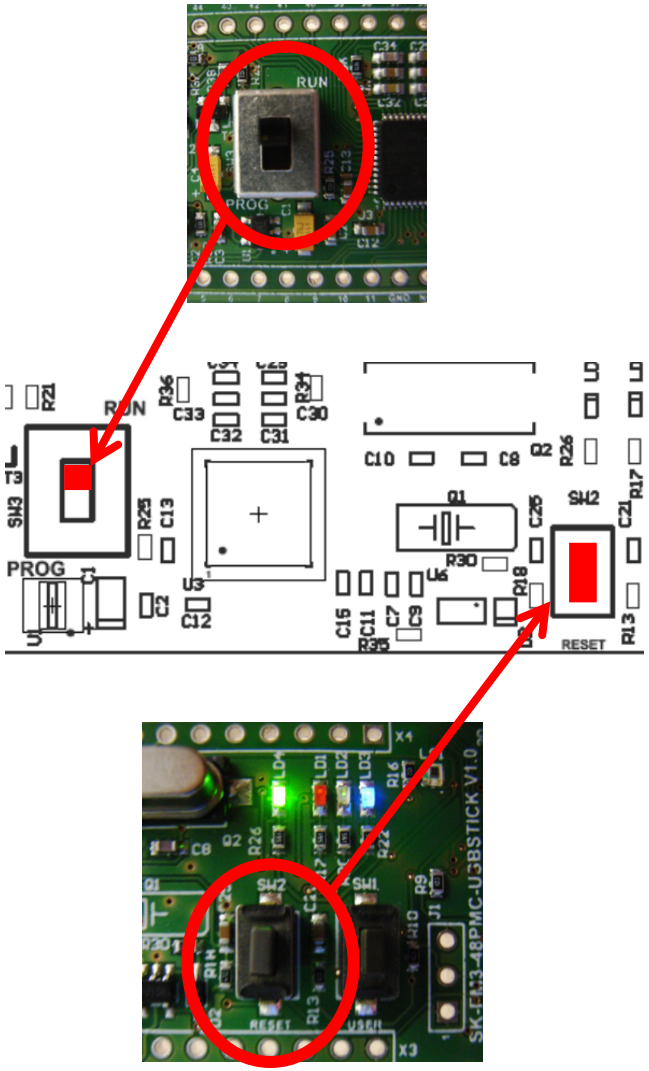
  - The firmware was programmed.



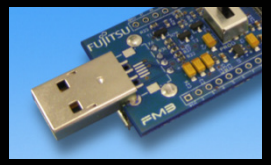
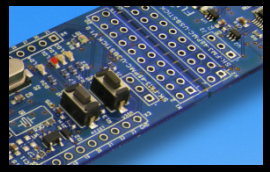
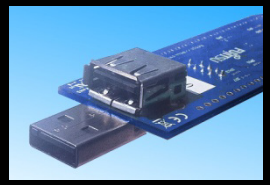
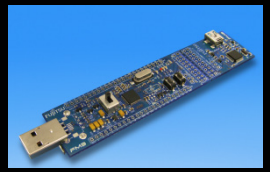
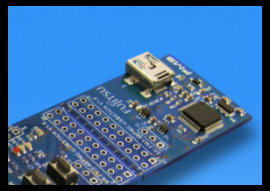
MCU Programming via USB

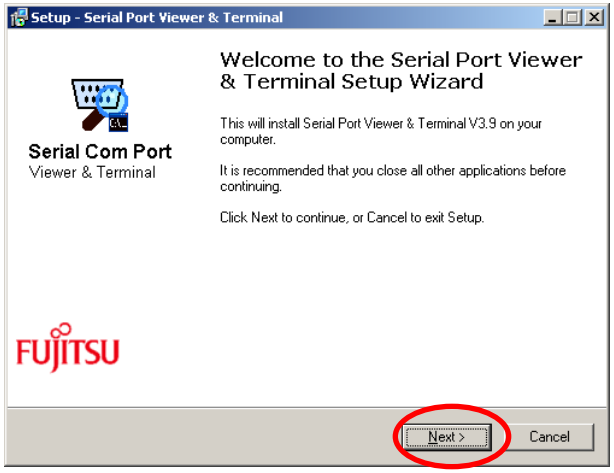
- **Step 8**
  - Switch SW3 to RUN
  - Press the reset button



Installation of Serial Port Viewer & Terminal

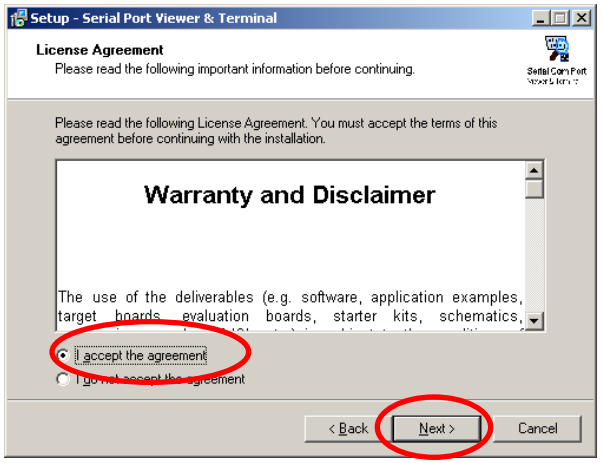






- Start Installation
  Serial Port Viewer & Terminal
  (utilities\serial_port_viewer\setup.exe)

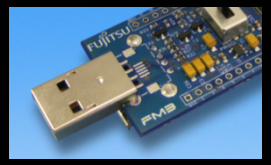
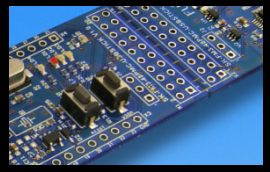
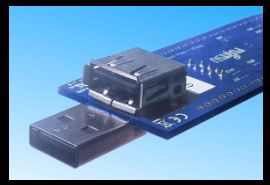
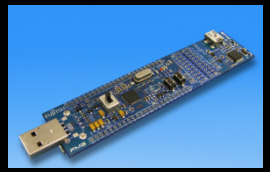
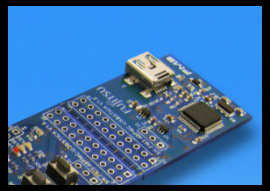


- Click "Next"

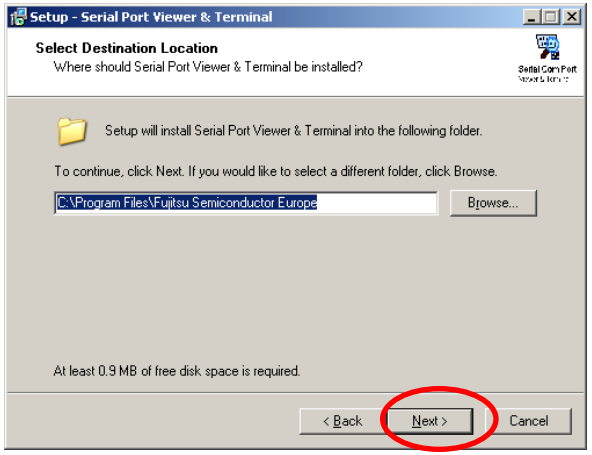
- Read and accept the disclaimer and click "Next"



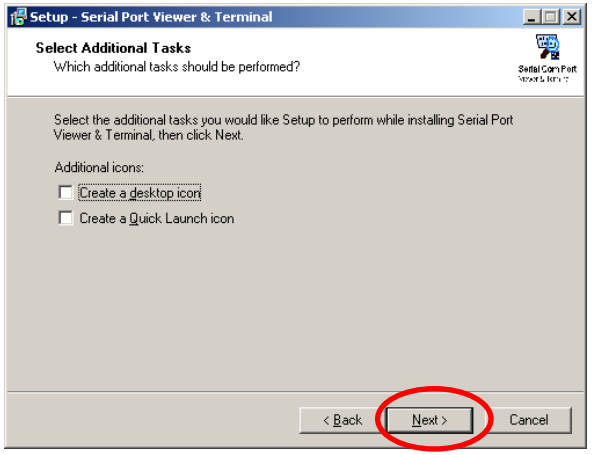
Installation of Serial Port Viewer & Terminal

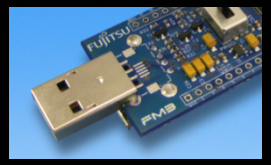
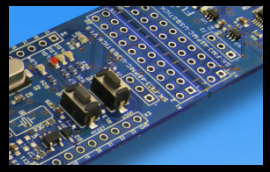
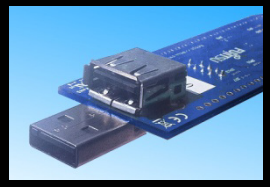
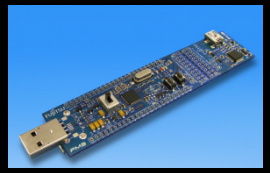
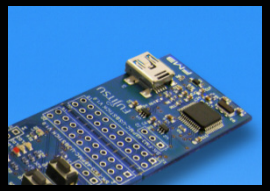
- Choose a optional installation directory and click "Next"



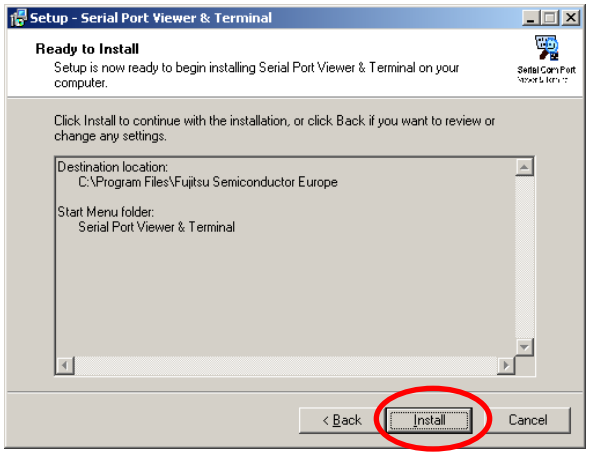
- Click "Next"



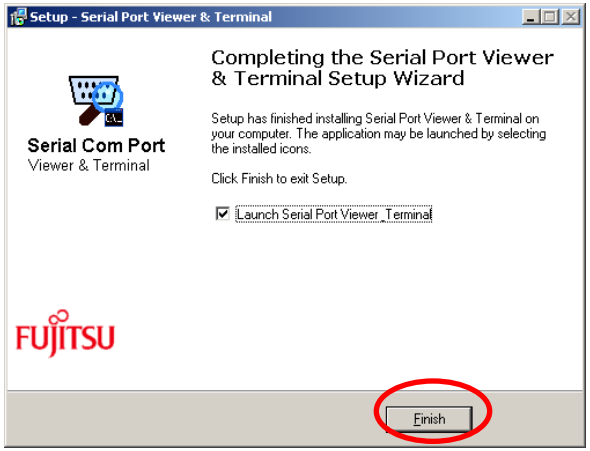
Installation of Serial Port Viewer & Terminal

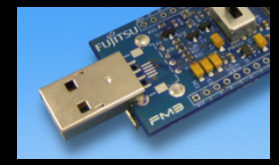
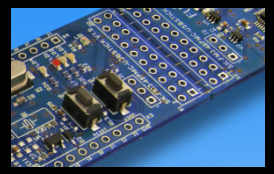
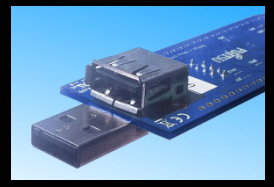
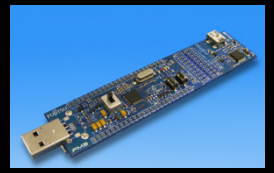
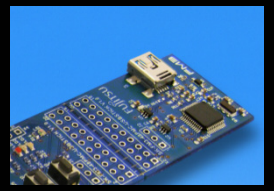
- Click "Install"



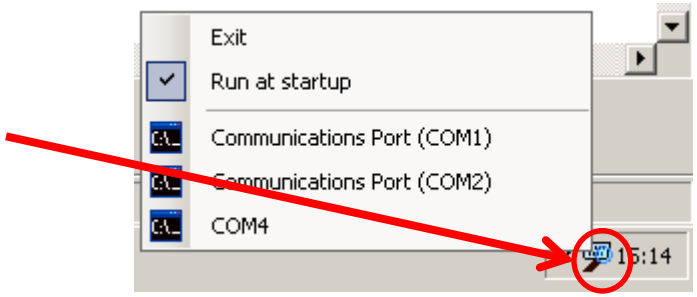
- Click "Finish" and the Serial Port Viewer & Terminal will be opened.

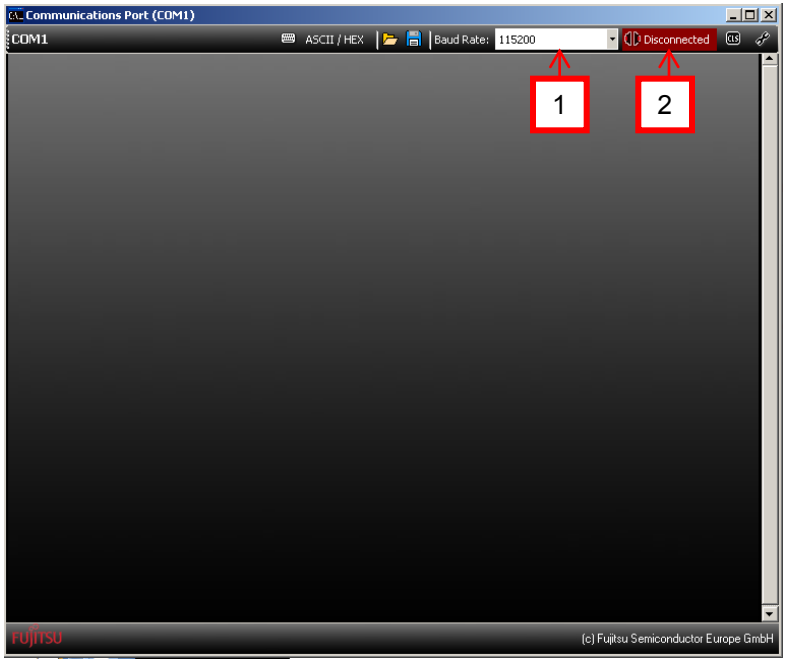


Installation of Serial Port Viewer & Terminal

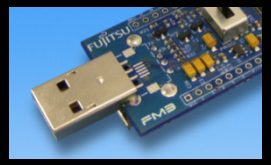
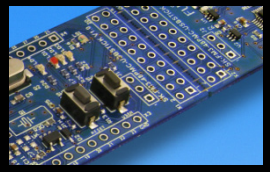
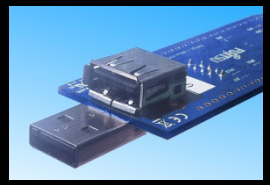
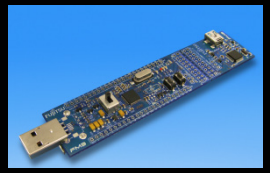
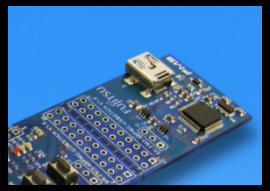
- The Serial Port Viewer & Terminal can be found as tray icon. Via right-click, the terminal for the specific com port can be opened.



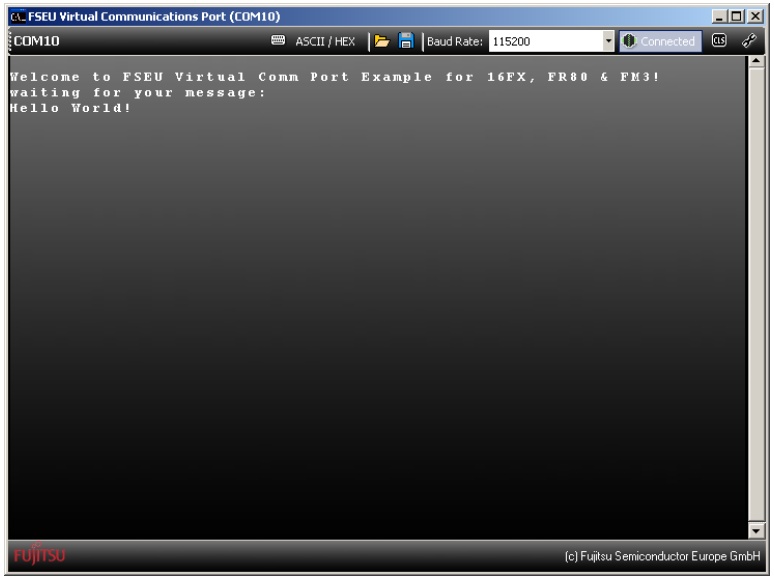


- 1. Select Baud rate (Default baudrate in examples is: 115200)
- 2. Click red blinking "Disconnected" button to connect

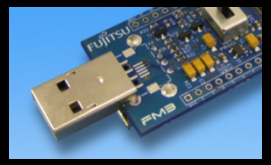
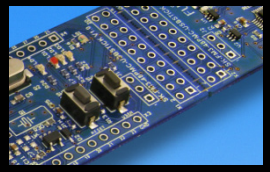
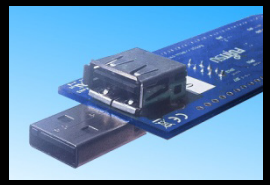
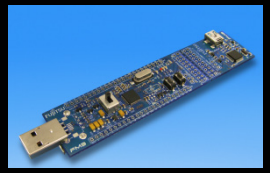
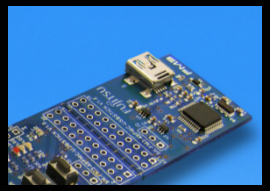
Virtual Com Port Example

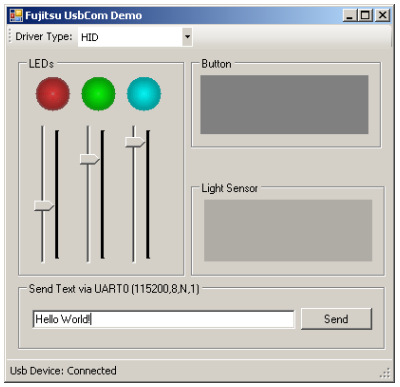
- Used to communicate via CDC class
- MCU source & binary
  [Examples\ sk-fm3-48pmc-usbstick_usb_device_virtual_com_port-v12]

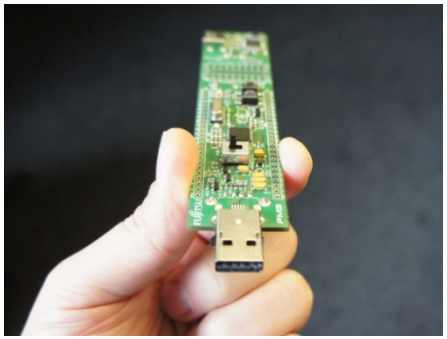


USB Host and Device (1)

- **Device Mode:**
  - HID Communication



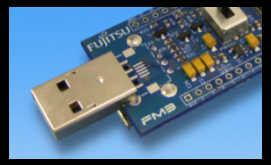
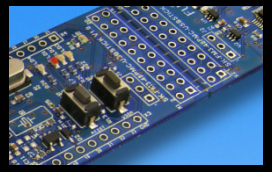
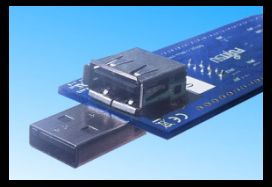
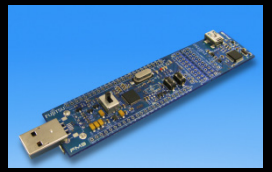
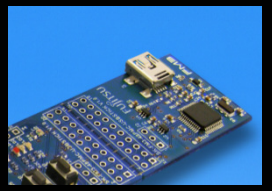


- **Host Mode:**
  - Mass Storage
  - Mouse
  - Keyboard

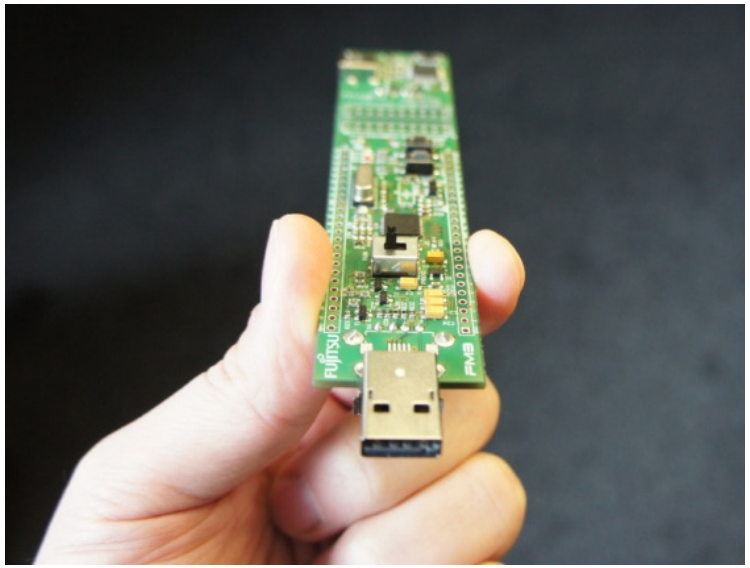
- **Example:**

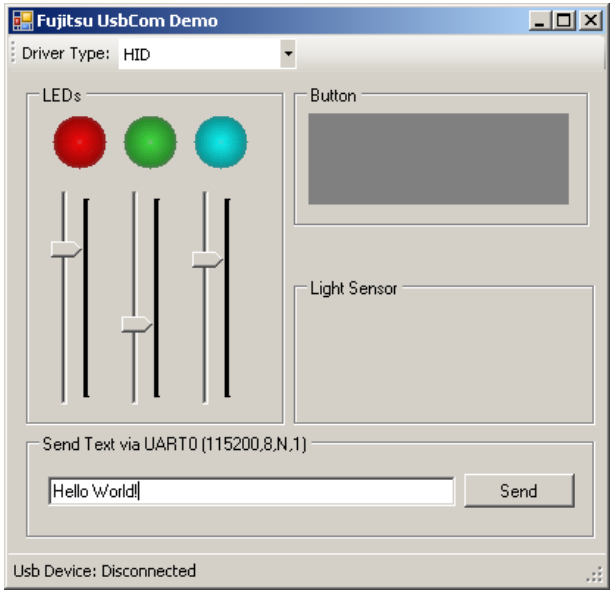
sk-fm3-48pmc-usbstick_usb_host_device-vXX

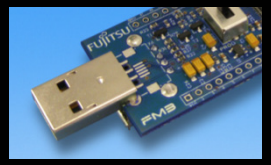
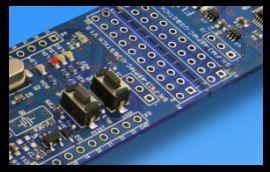
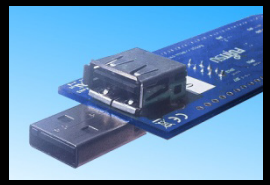
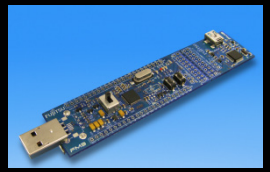
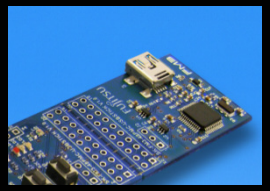
USB Host and Device (2)

- **USB Device connected to PC**
  - LEDs turns off
  - Within example sk-fm3-48pmc-usbstick_usb_device_hid_communication-v12 in folder "forwindows\Binary" the PC Demo can be found: "Fujitsu_UsbCom_Demo.exe"
  - LEDs, Sensors, Buttons and UART can be used via GUI

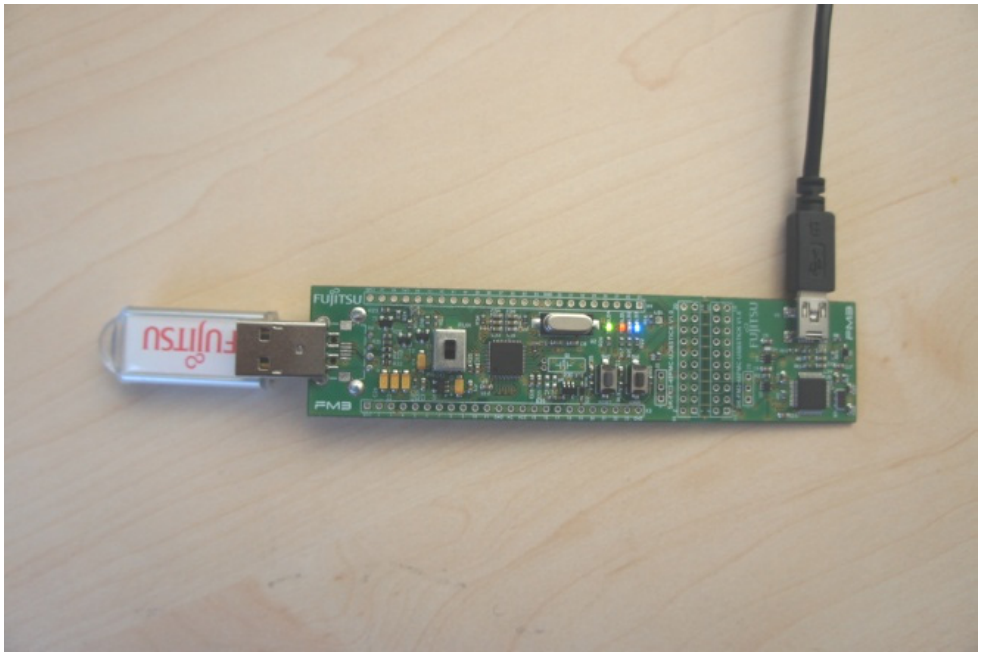




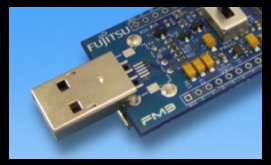
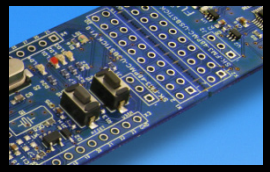
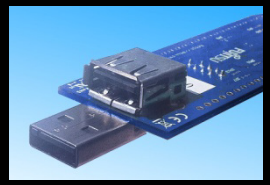
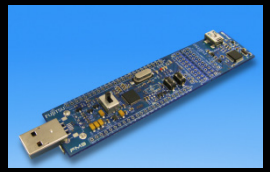
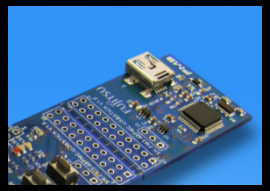






USB Host and Device (3)

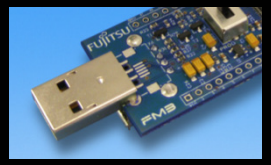
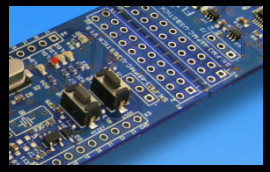
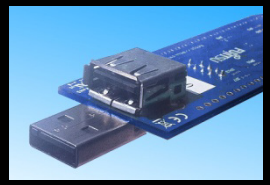
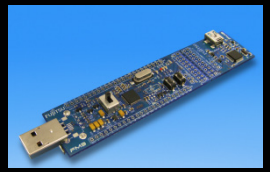
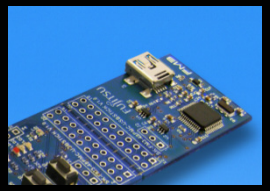
- **USB Mass Storage via Host**
  - Red LED turns on after a few seconds
  - Content of USB Stick will be displayed via UART 0 (X5), 115200,8,N,1
  - *fujitsu.txt* file will be written
  - Red LED turns off and green LED turs on for ready to disconnect



USB Host and Device (4)

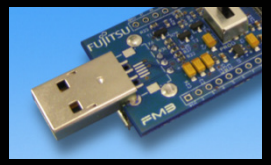
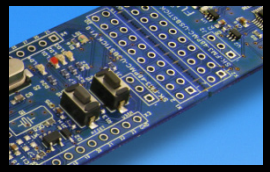
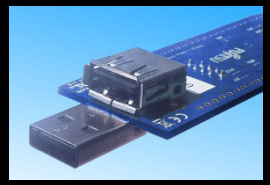
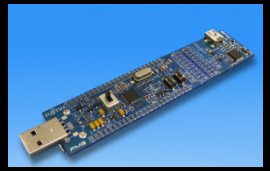
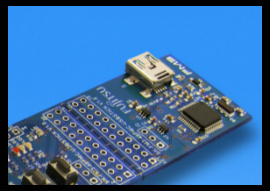
- **USB Mouse via Host**
  - Green LED turns on after a view seconds
  - Position will be displayed via UART 0 (X5), 115200,8,N,1
  - LEDs can be dimmed via X/Y movement and scroll wheel

USB Host and Device (5)

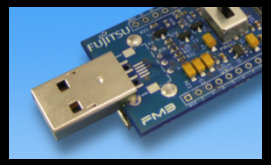
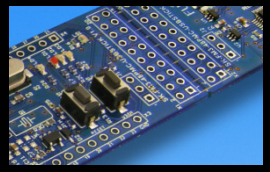
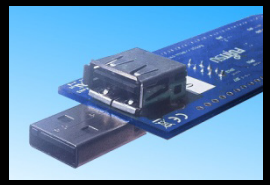
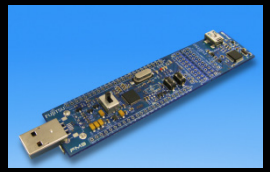
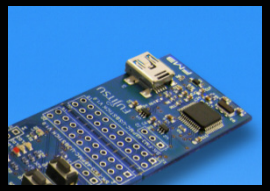
- **USB Keyboard via Host**
  - Green LED turns on after a few seconds
  - Text typed will be displayed via UART 0 (X5), 115200,8,N,1
  - LEDs can be switched via key 1-3

Create own USB Applications

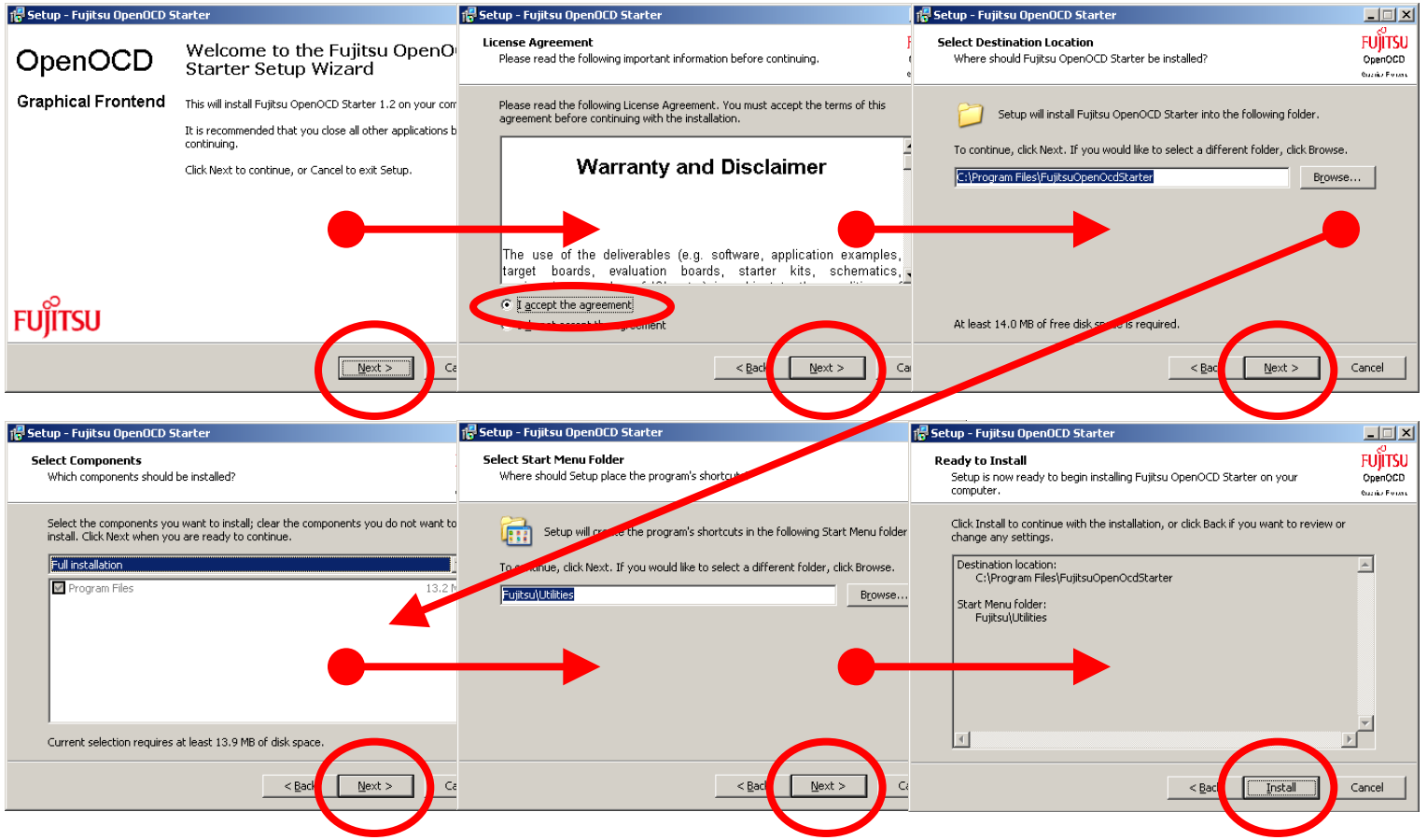






- **Using the Fujitsu USB Wizard**
  - Easy to use, step by step
  - Creates USB Host / Device Projects
  - Combines microcontroller templates, board support and USB use case
  - Download the newest version from internet (http://emea.fujitsu.com/fm3)
  - Start Installation (utilities\usb_wizard\setup.exe)

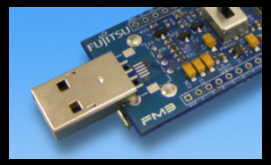
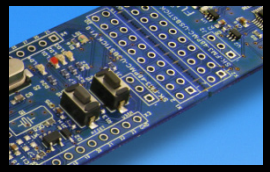
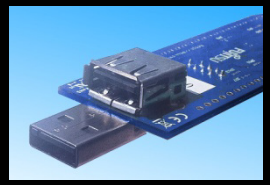
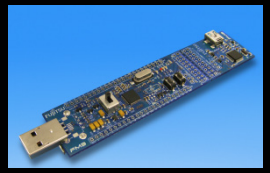
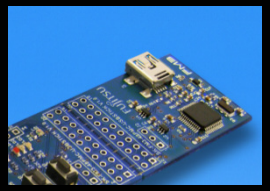
Installation of the USB-driver

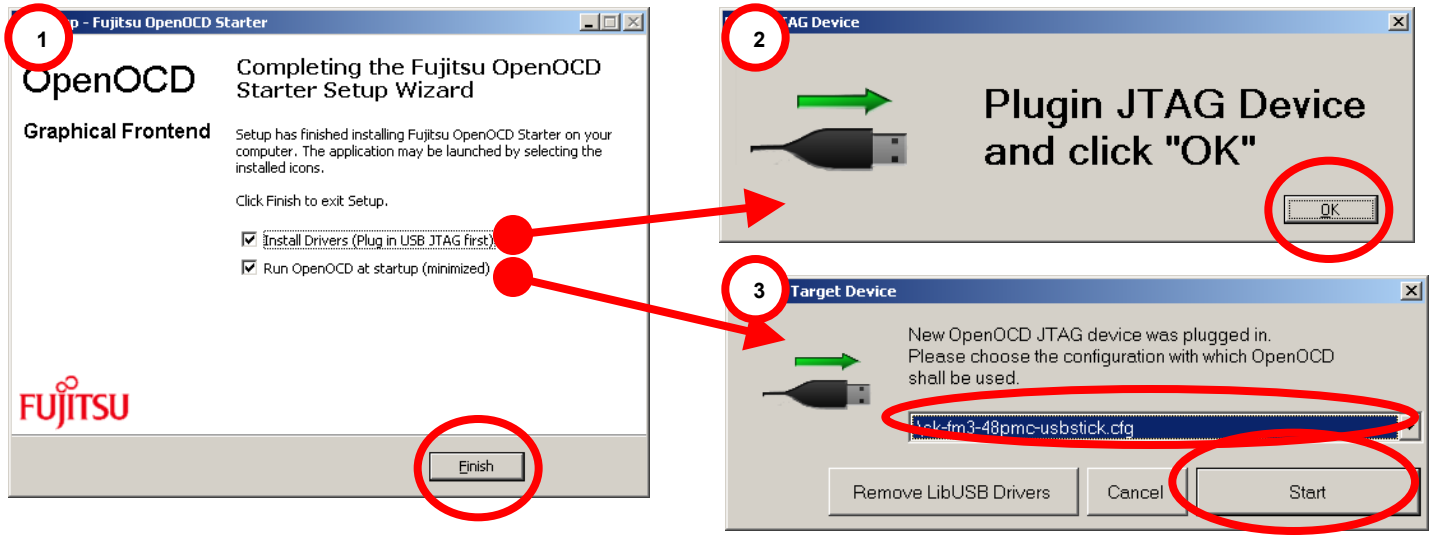
- **Install Fujitsu OpenOCD Starter (min. V1.2)**
  - Run Installation (utilities/openocd_starter/setup.exe)



Installation of the USB-driver

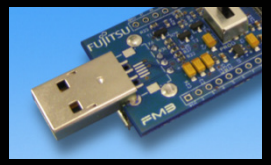
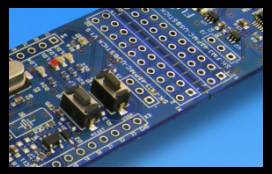
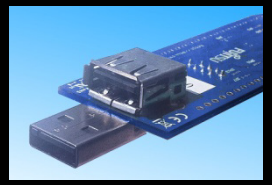
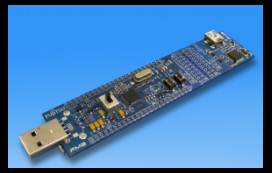
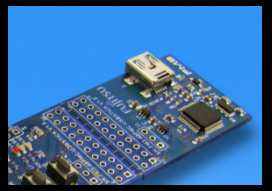






- **Install Drivers during Installation**

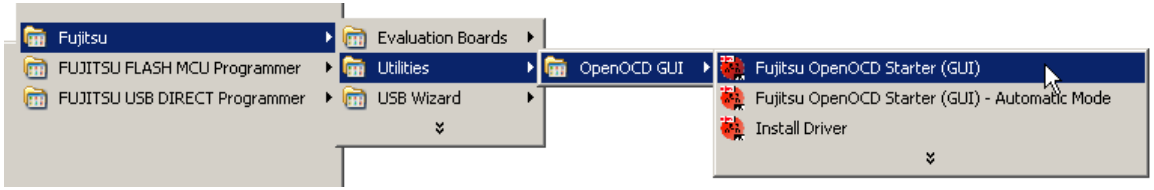


- 1) Select „Install Drivers“ and „Run OpenOCD at startup“
- 2) Plug in the evaluation board at USB DEBUG (X13) and click ‚OK‘
- 3) Select target board „.\sk-fm3-48pmc-usbstick.cfg“ and click ‚Start‘ to run OpenOCD GDB Server

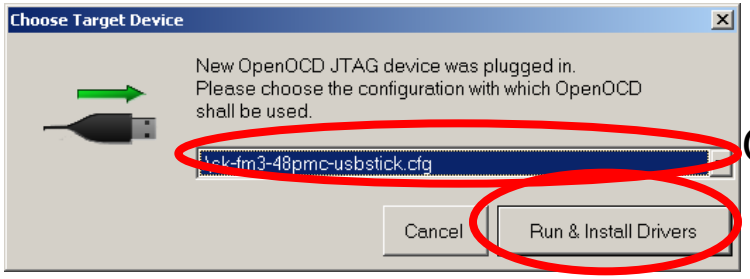
Installation of the USB-driver

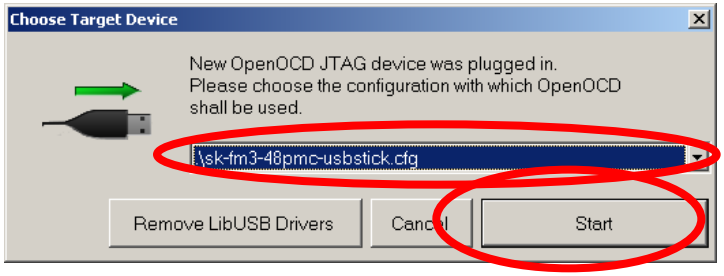
- **(Optional) Install Drivers after Installation**
  - Run Fujitsu OpenOCD Starter (normally started in background)



  - Connect the evaluation board and wait for following pop-up window (If connected, disconnect and connect again)

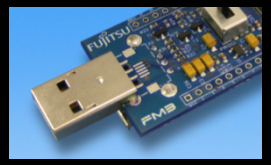
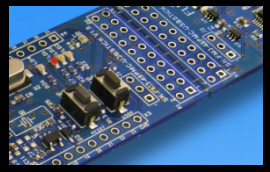
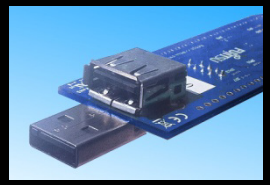
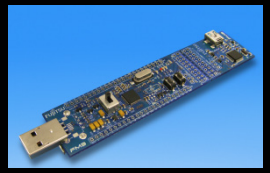
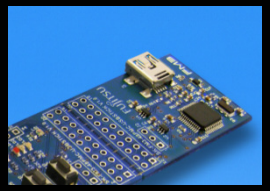


OR

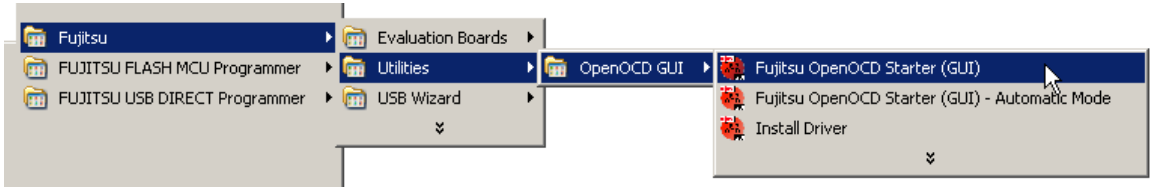


  - Select „\sk-fm3-48pmc-usbstick.cfg“ and click „Run & Install Drivers“

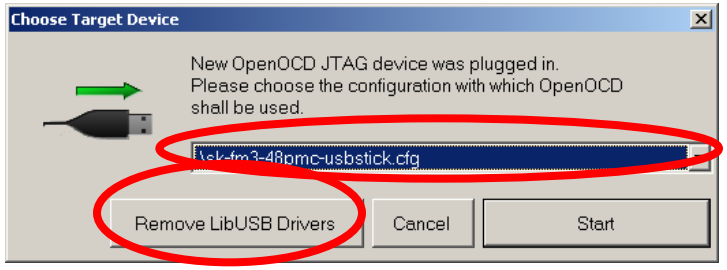
Deinstallation of the USB-driver

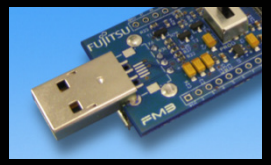
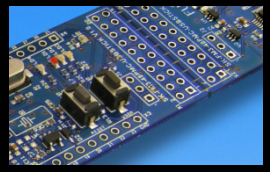
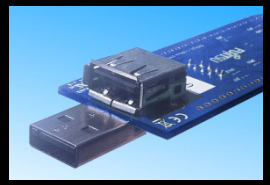
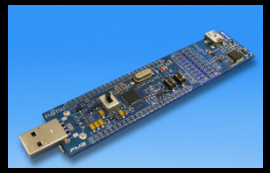
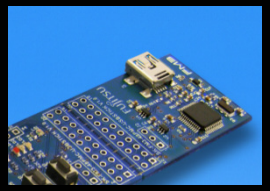
- **(Optional) Uninstall Drivers after Installation**
  - Run Fujitsu OpenOCD Starter (normally started in background)



  - Connect the evaluation board and wait for following pop-up window (If connected, disconnect and connect again)

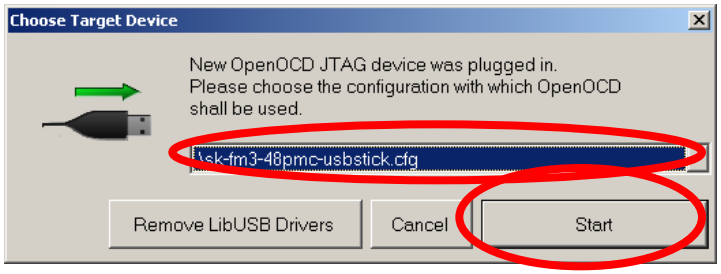


  - Select „\sk-fm3-48pmc-usbstick.cfg“ and click „Remove LibUSB Drivers“

Debugging via JTAG

- **The MB9AF312K microcontroller offers a JTAG-Interface that is supported by SK-FM3-48PMC-USBSTICK.**
  - To debug your program, the on-board OpenOCD compatible USB to JTAG adapter can be used (X5). It offers USB to one port JTAG interface and one port UART interface.
  - See also Install Drivers
  - After connecting the evaluation board to the PC, following dialog should pop-up:

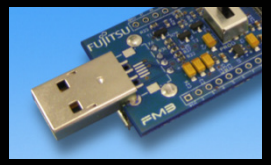
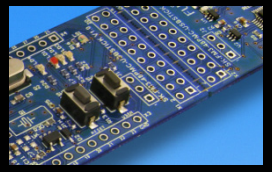
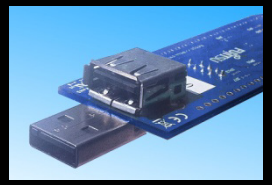
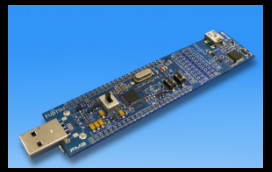
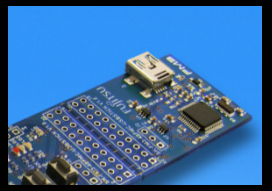


  - Choose „sk-fm3-48pmc-usbstick.cfg“ and click „Start“

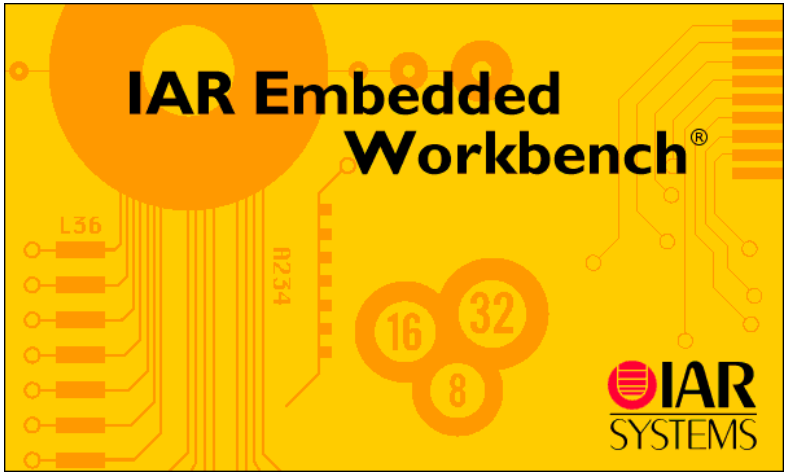
Debugging via JTAG

- **The MB9AF312K microcontroller offers a JTAG-Interface that is supported by SK-FM3-48PMC-USBSTICK.**
  - To debug your program with a JTAG-Adapter e.g. Segger J-Link
  - Connect the J-Link to the JTAG-Interface routed to the 20-Pin-Header on X1 and to the USB-Port of your PC

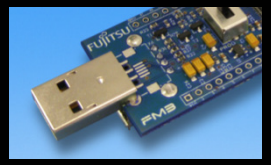
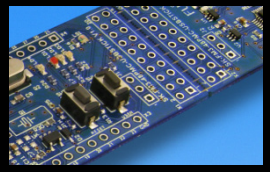
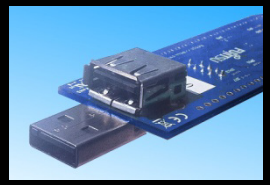
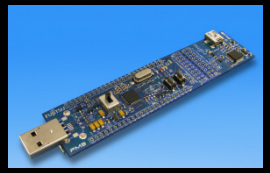
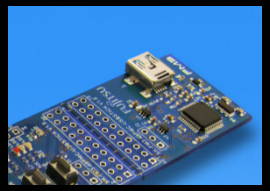
IAR-Embedded Workbench / KEIL µVision IDE and Debugger

- Installation
- Getting Started
- Open Project
- Build Project
- Debug Project

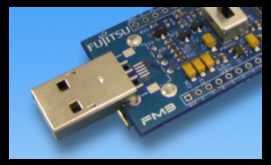
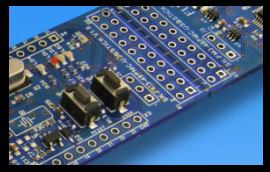
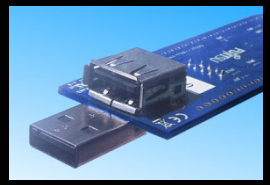
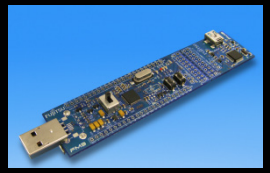
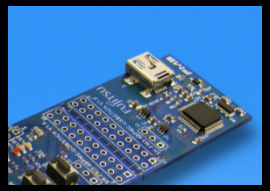


IAR Workbench Getting Started

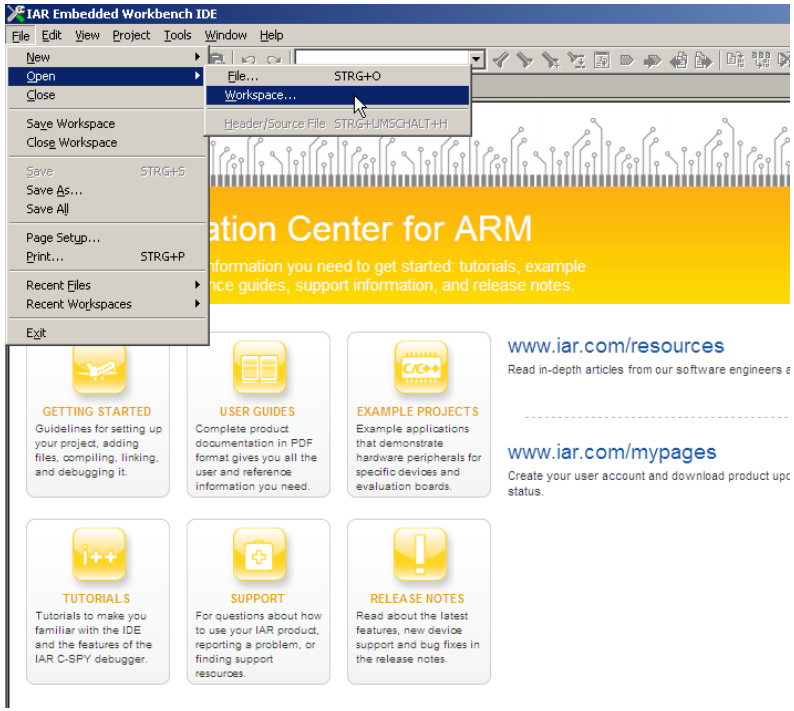






- **Install EWARM from IAR-CD or download latest version from IAR Website**
  - EWARM 30-day Evaluation Version
    - http://supp.iar.com/Download/SW/?item=EWARM-EVAL
  - EWARM 32K Kickstart Version
    - http://supp.iar.com/Download/SW/?item=EWARM-KS32
- **Start EWARM Workbench**

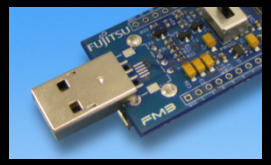
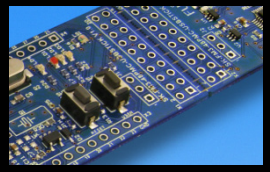
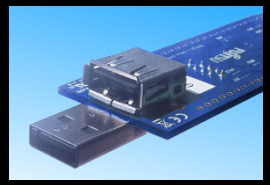
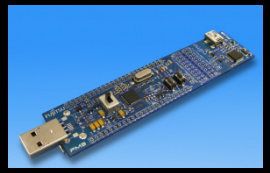
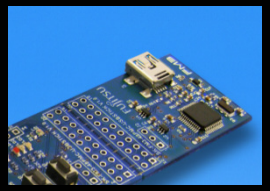
IAR Workbench Getting Started

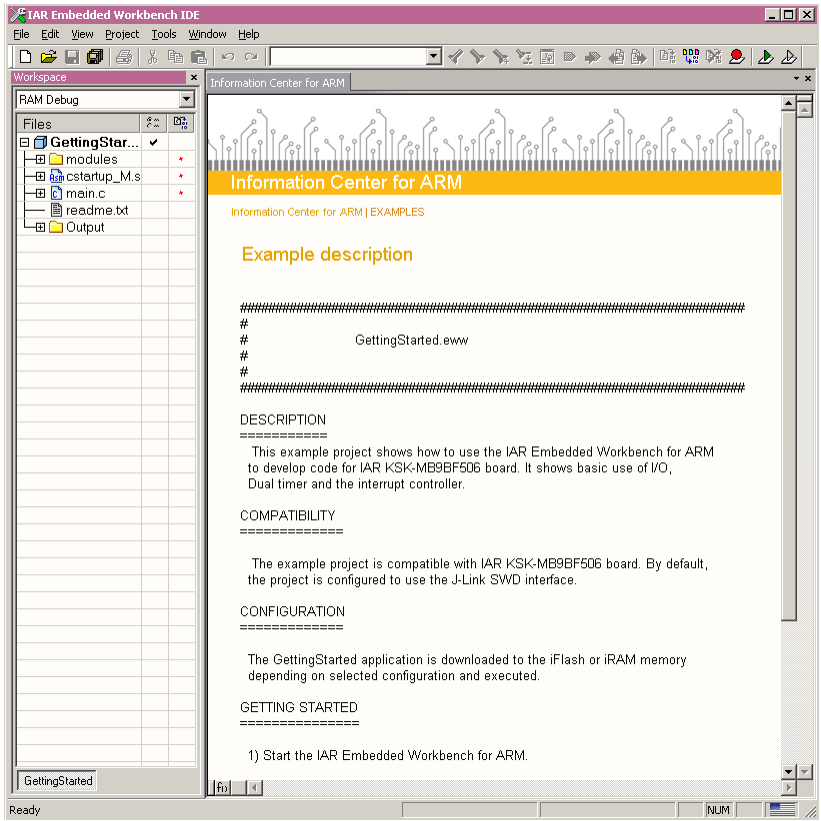
- Choose *File → Open → Workspace*
- Select e.g.*\Examples\sk-fm3-48pmc-usbstick_usb_device_hid_communication-vXX\example\IAR\sk-fm3-48pmc-usbstick_usb_device_hid_communication.eww*



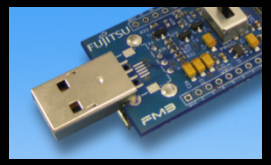
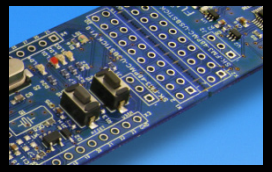
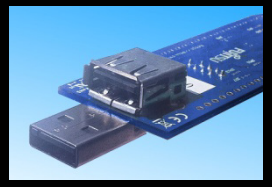
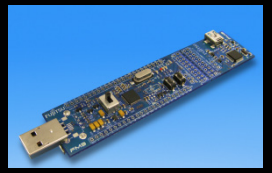
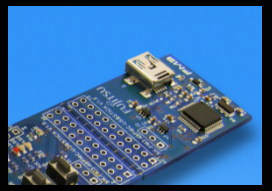
IAR Workbench – Main Window

- **IAR Workbench**
  - Workspace on left side of Workbench window
    - Choose: *View→Workspace*, if hidden
  - Source files on right side of Workbench window as tabbed windows
  - Project can alternatively be opened by: *File→Open→ Workspace→*.eww*



IAR Workbench – Menu Bar

- **Menu Bar**

File Control (new, open, save, etc.)

Configuration Control (e.g. RAM or ROM debugging)

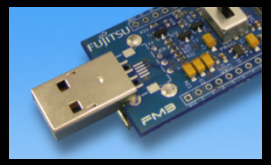
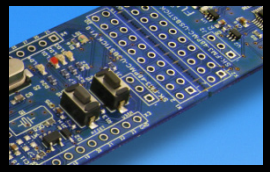
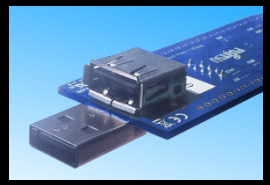
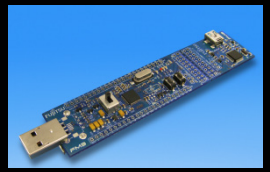
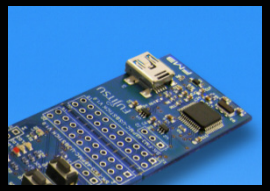
Build Control (compile, make, stop build)

Edit Control (cut, copy, paste, undo, redo)

Navigation Control (Find, Bookmarks, File Navigation, etc.)

Debug Control (Breakpoint, start Debug w/ and w/o download)

IAR Workbench – Workspace

- **IAR Workspace Window**

Project Name

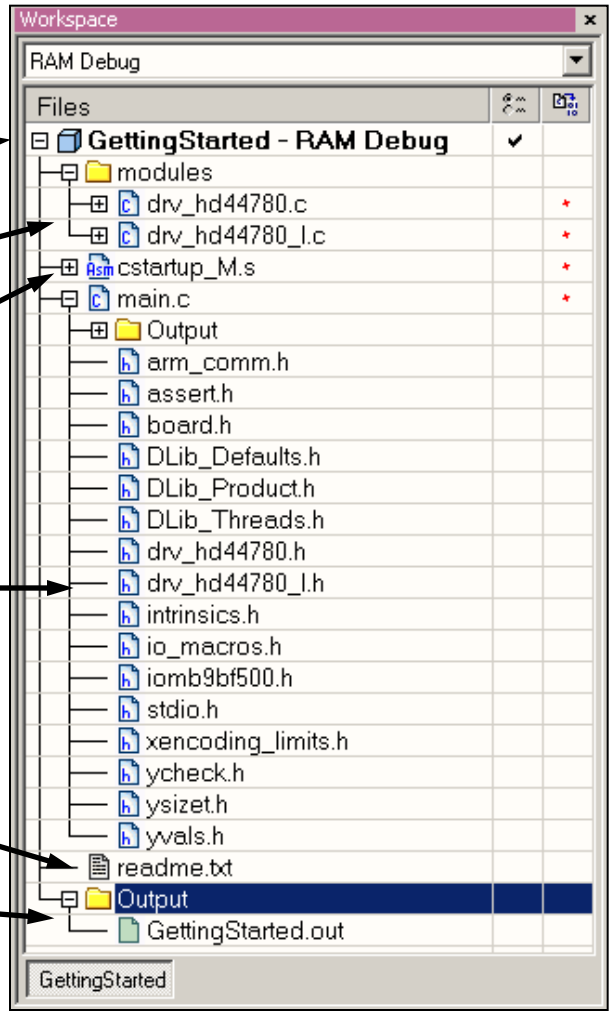
Sub Folder Modules

Main Modules

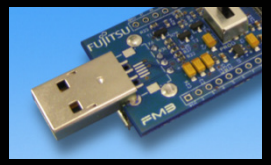
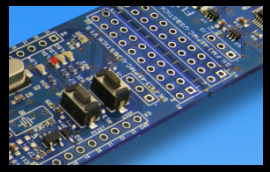
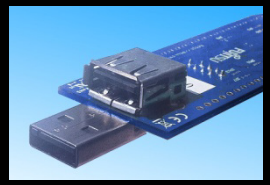
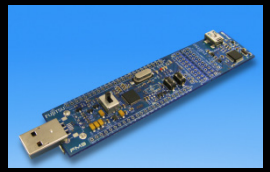
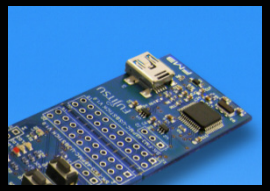
Module Includes

Project Description

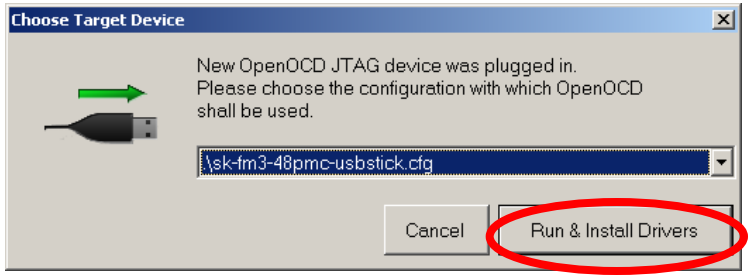
Project Built Output



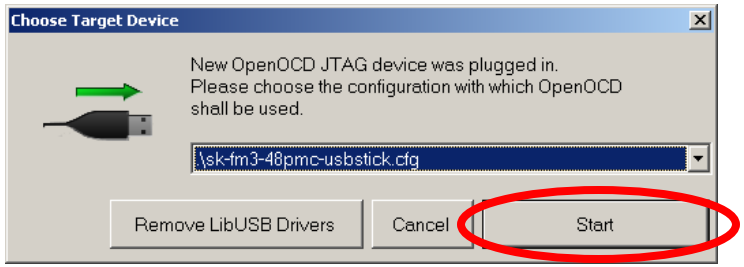
IAR Workbench - OpenOCD (GDB)

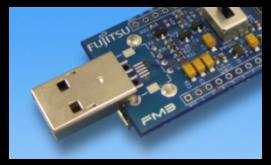
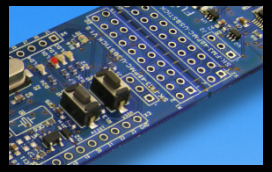
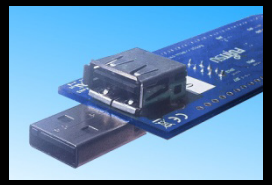
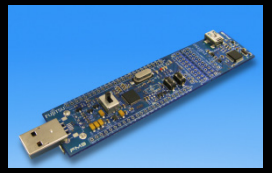
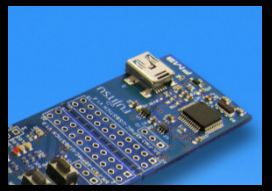
- **Setup OpenOCD Debugger**
  - Install drivers of OpenOCD Starter
  - (A) Run & Install Drivers



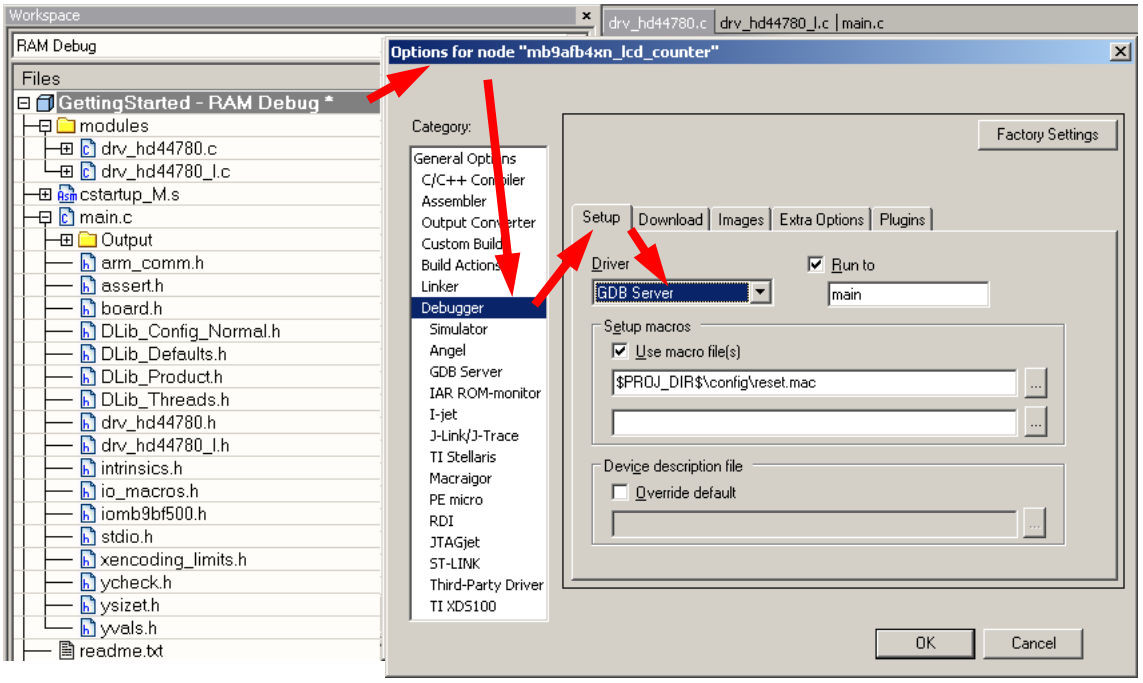
  - (B) Start OpenOCD GDB Server



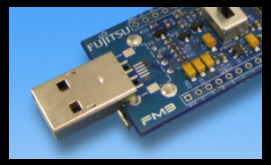
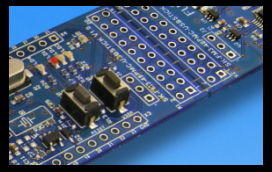
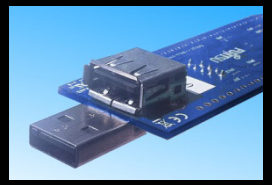
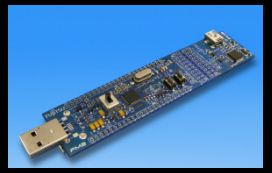
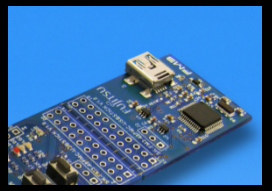
IAR Workbench - OpenOCD (GDB)

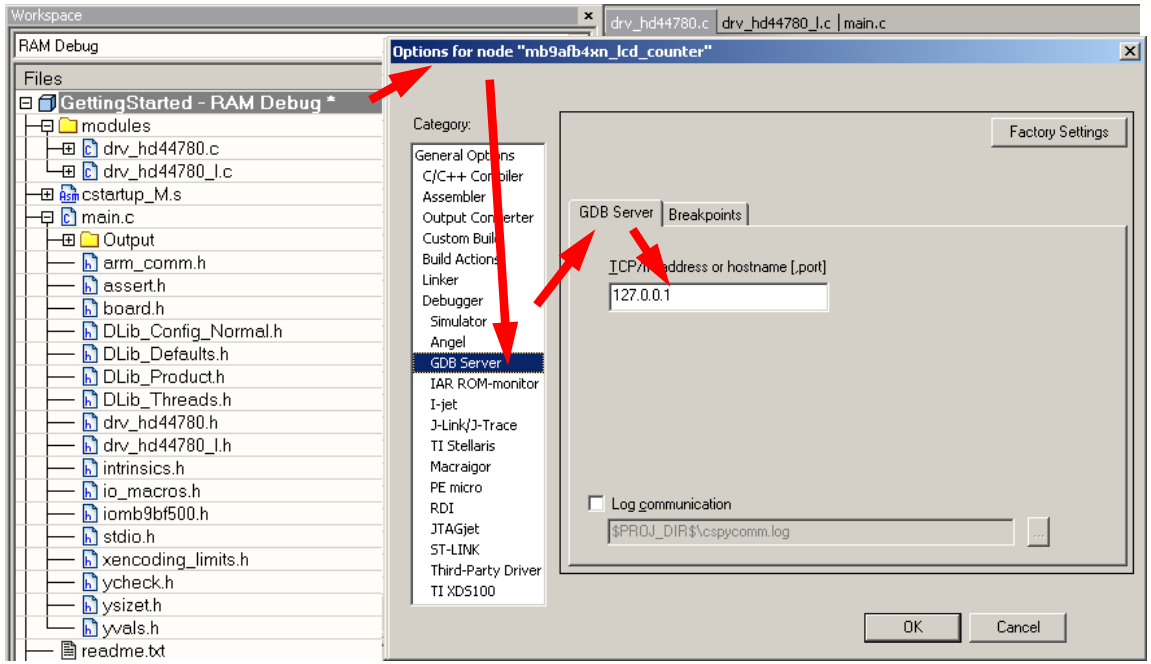
- **OpenOCD / GDB Server usage**
  - Mark Project File in Workspace
  - Choose *Project→Options*
  - Choose GDB Server in Debugger Setup



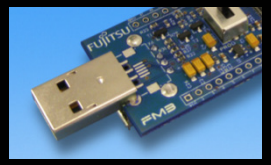
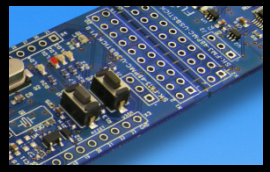
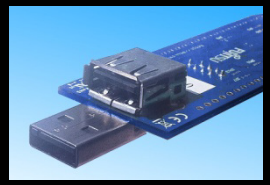
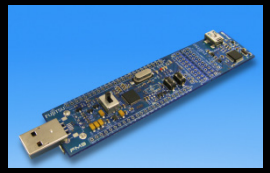
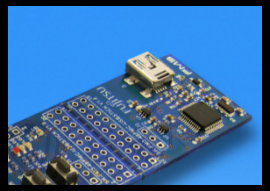
IAR Workbench - OpenOCD (GDB)

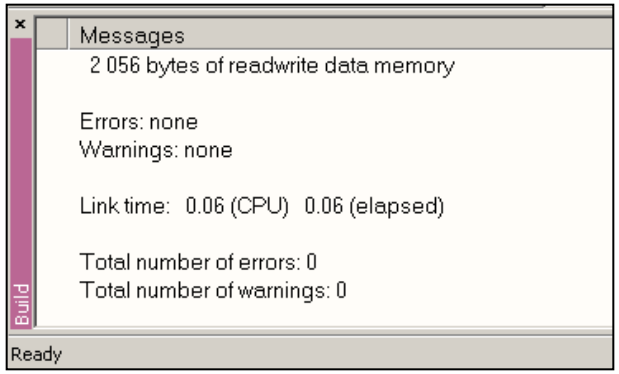
- **OpenOCD / GDB Server usage**
  - Set GDB TCP/IP Address: 127.0.0.1
  - Start GDB Debugger with usual  Icon



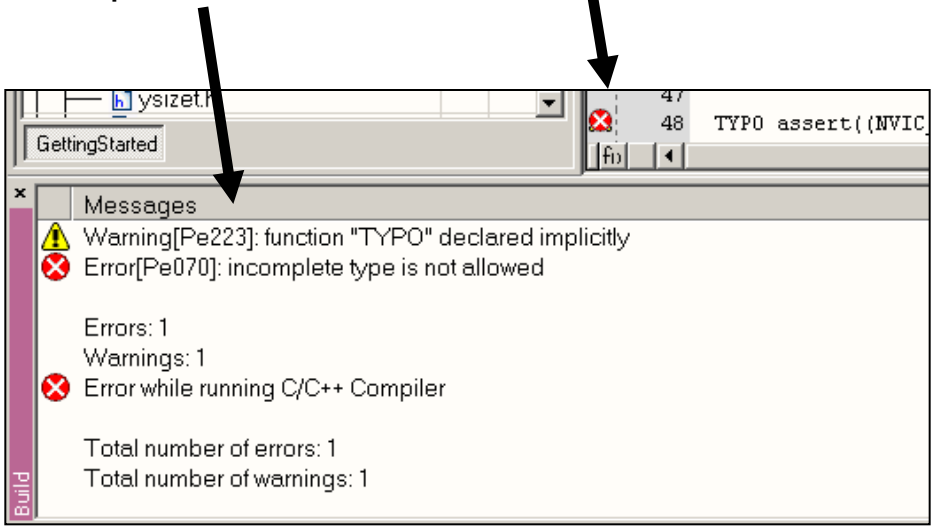
IAR Workbench – Making Project

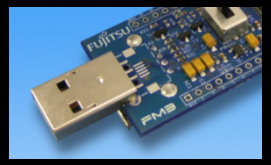
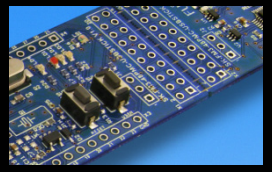
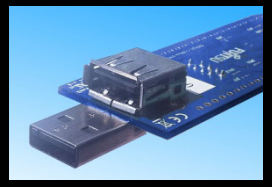
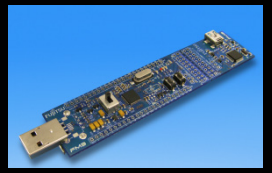
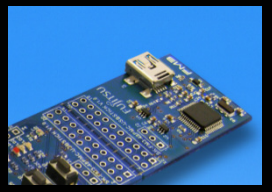
- **Making the Project**
  - Use Make-Icon ( ), <F7> or Menu: *Project→Make*
  - Check for no errors in Output window below



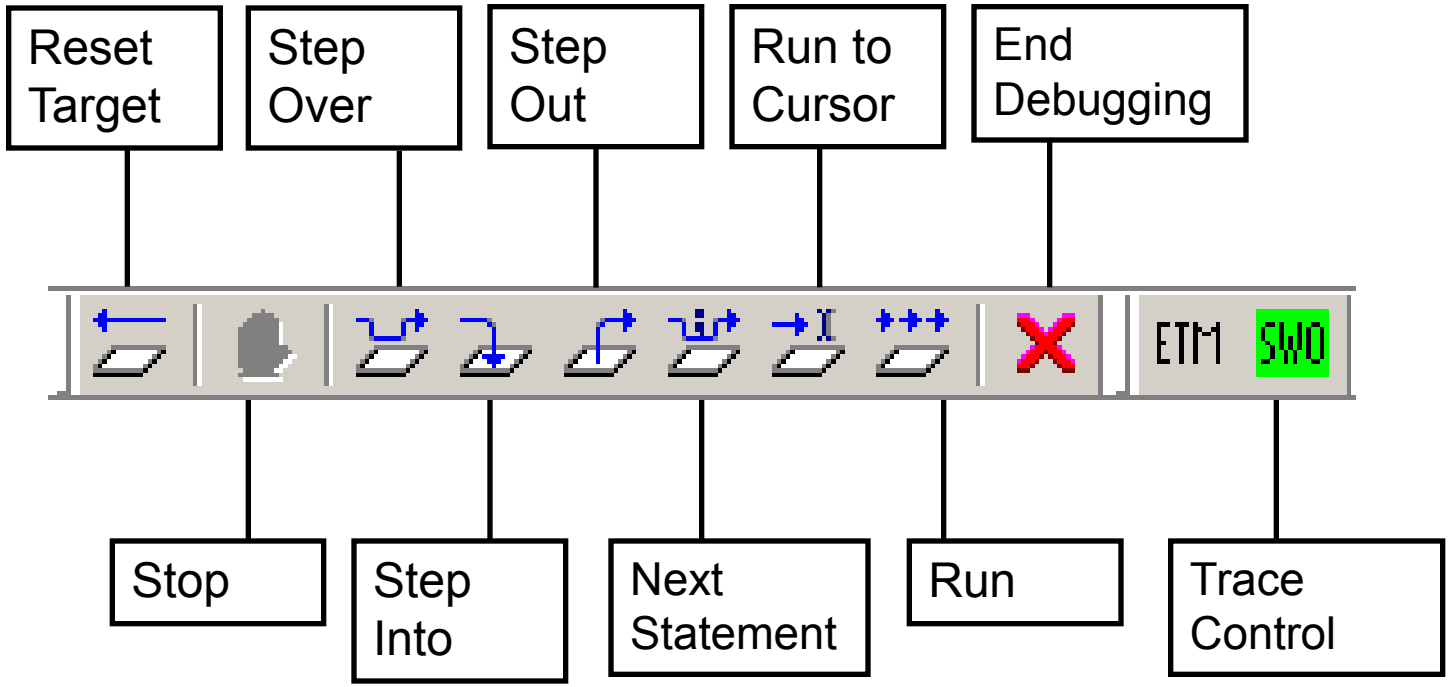
  - Build errors are indicated by or In Output window and Source view



IAR Workbench – Download to Target

- **Download to Target and Start Debugging**
  - Use  Icon, <Ctrl>-D, or *Project→Download and Debug*
  - A new menu bar will occur on sucessful connection to target

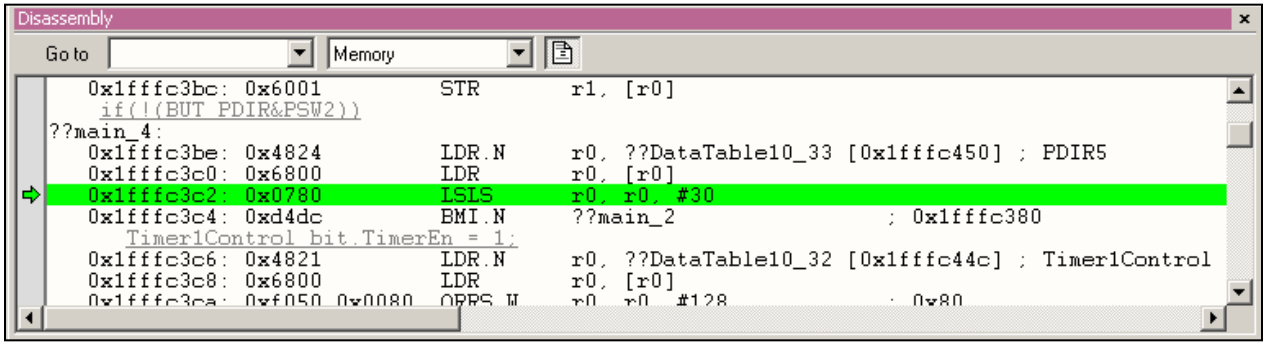


IAR Workbench – Debug (1)

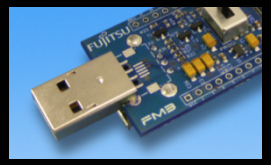
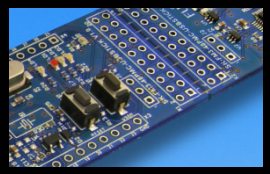
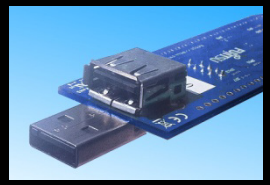
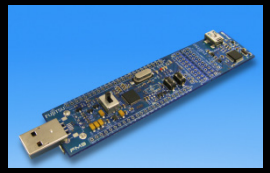
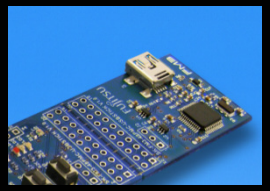
- **Source Window**
  - The Source windows do not change contents but get additional information
    - Current line (PC):
    - Halted on Breakpoint:
    - Halted on Data break (example):

```
165  CSW_TMR_bit.MOWT = 9;
172  PSW_TMR_bit.POWT = 2;
148  Timer1IntClr = 1;
```

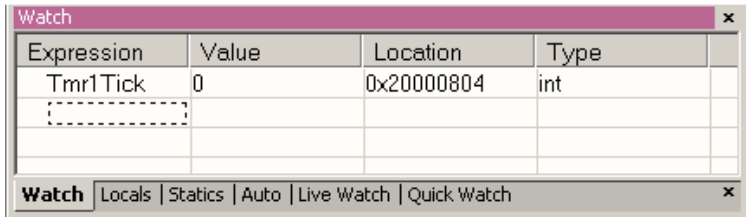
- **Disassembly Window**
  - Shows ‘pure‘ disassebly view
  - Shows mixed mode view



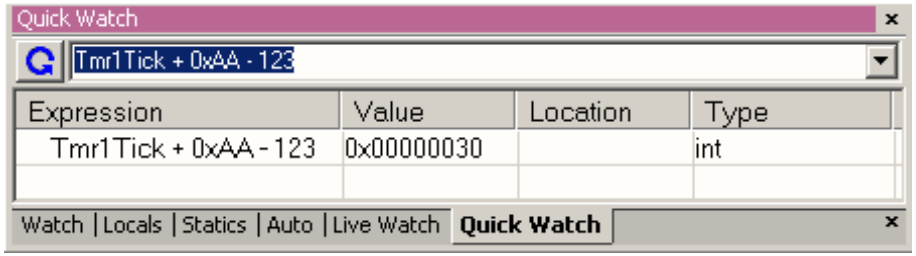
IAR Workbench – Debug (2)

- **Watch Window**
  - Watch
    - Expressions/Variables have to be added by user and are updated by Halt/Breakpoint

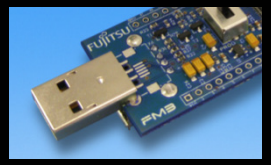
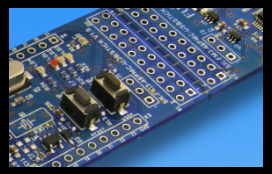
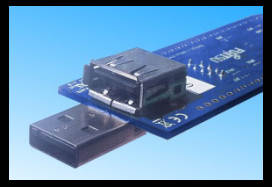
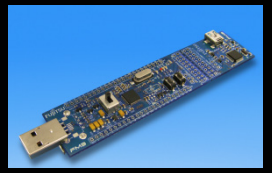
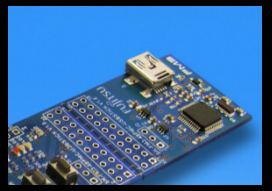


  - Quick Watch
    - The Quick watch allows the user to calculate and recalculate expressions even with variables

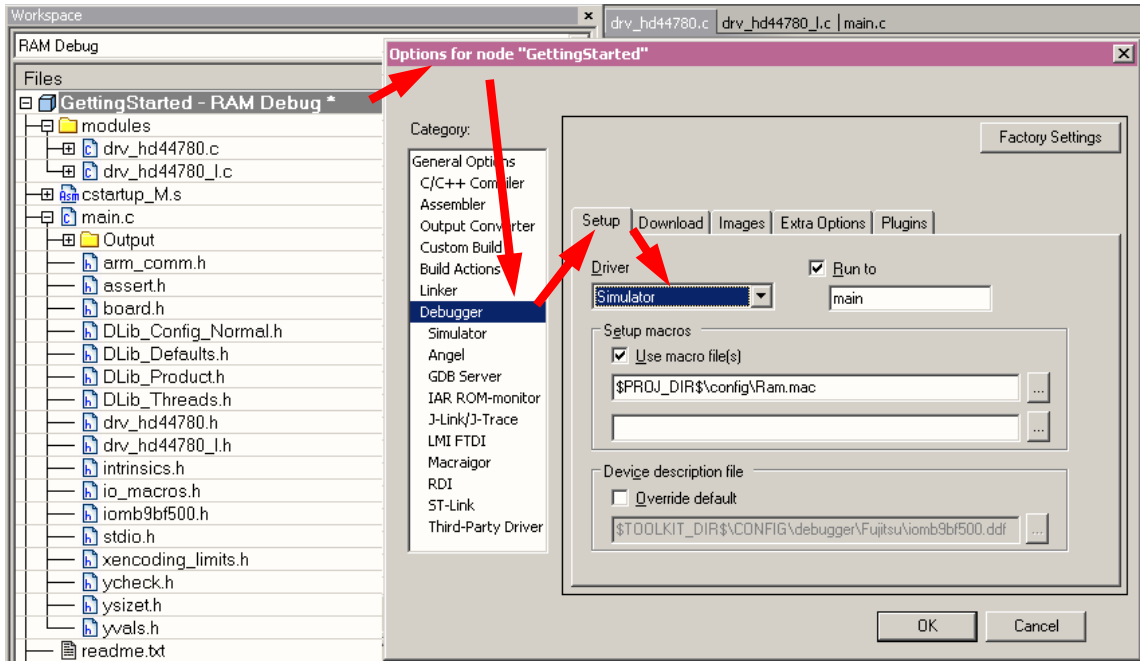


    - The drop down menu memorizes the last typed contents

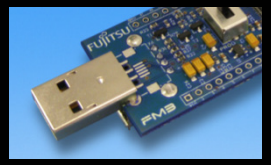
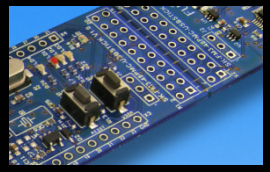
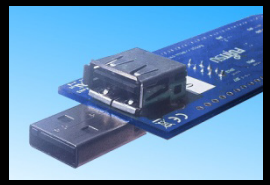
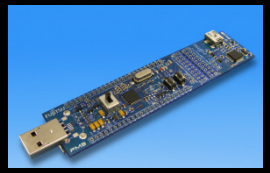
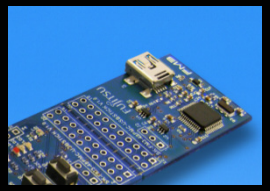
IAR Workbench – Simulator

- **Simulator**
  - Mark Project File in Workspace
  - Choose *Project→Options*
  - Choose Simulator in Debugger Setup
  - Start Simulator with usual  Icon

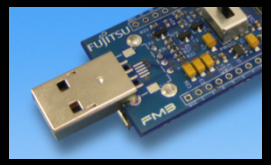
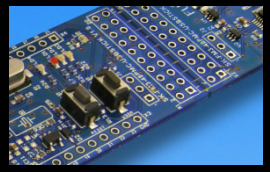
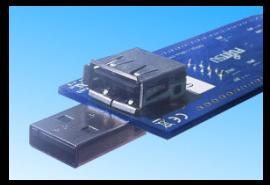
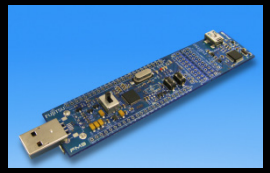
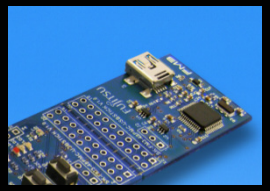


KEIL µVision IDE and Debugger Getting Started

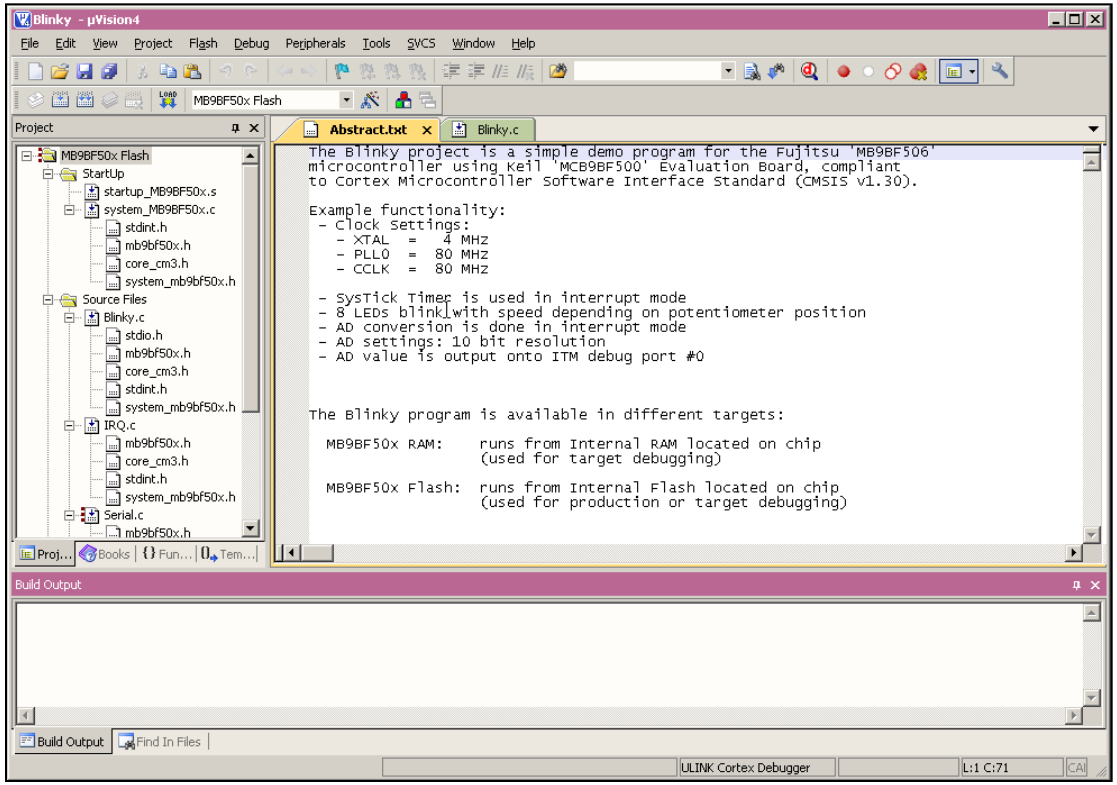






- **Install µVision from KEIL-CD or download latest version from KEIL Website**
  - Evalualtion Version
    - https://www.keil.com/demo/eval/arm.htm
    - Registration required
- **Install Colink Plugin for Keil RealView MDK (for OpenOCD usage)**
  - http://www.coocox.net/CoLinkGuide/CoMDKPlugin.html
- **Start µVision**

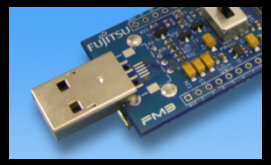
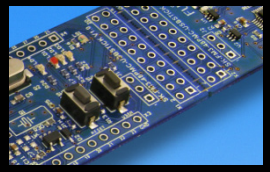
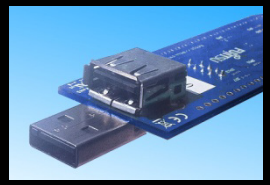
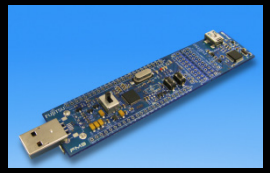
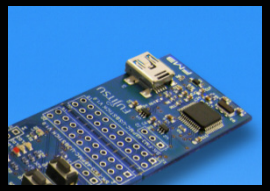
KEIL µVision – Getting Started

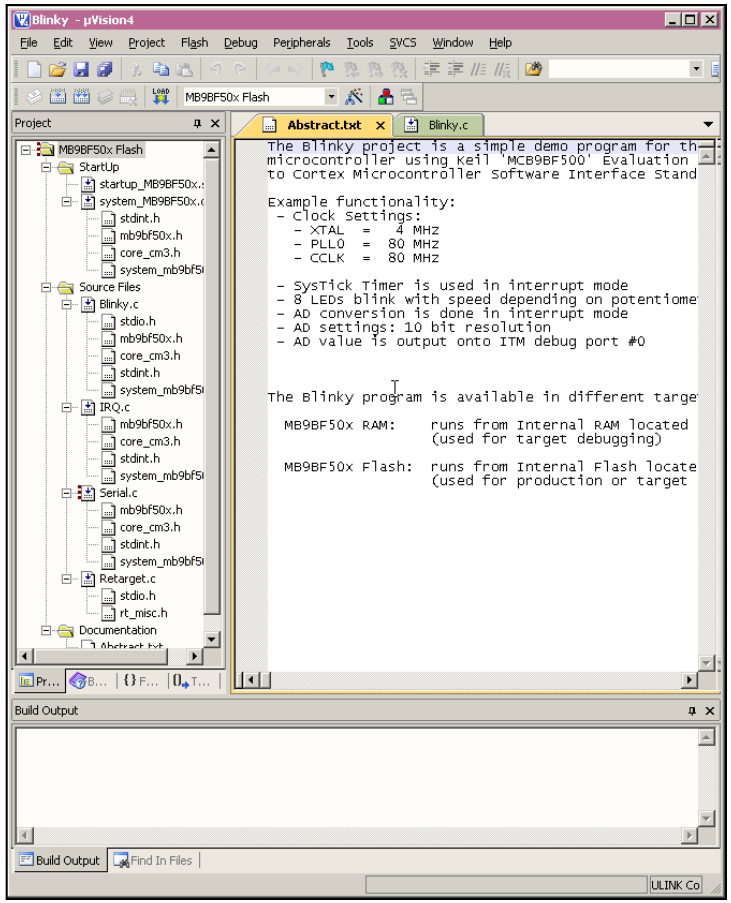
- **Choose Menu: *Project→Open Project...***
  - Browse to: Examples\mb9afb4xn_lcd_counter-vXX\example\ARM\
  - Choose *mb9afb4xn_lcd_counter.uvproj*



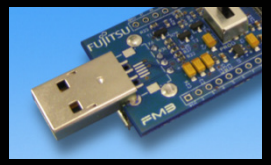
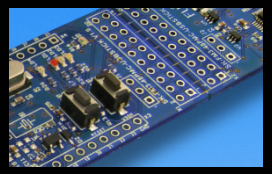
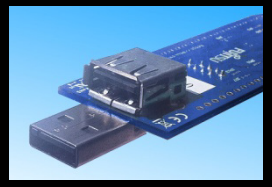
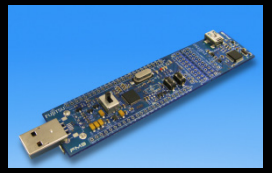
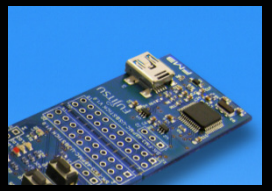
KEIL µVision – Main Window

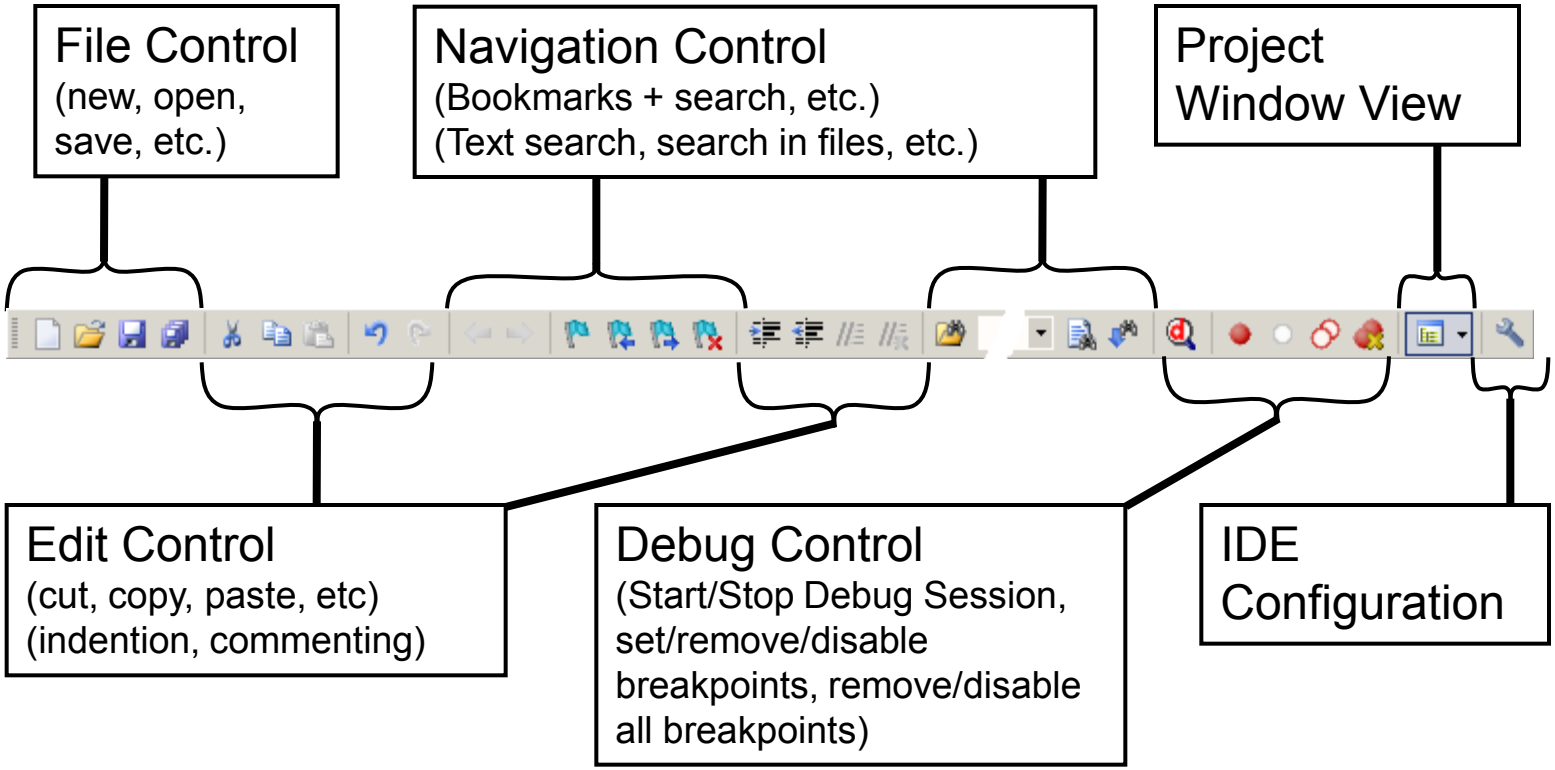
- **KEIL µVision**
  - Project window on left side of IDE window
    - Choose: *View→Project Window* if hidden
  - Source files on right side of IDE window as tabbed windows
  - Output window on bottom side of IDE window



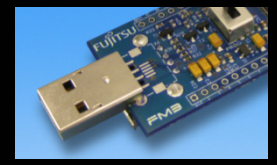
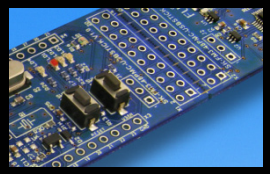
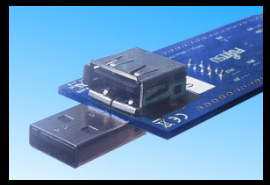
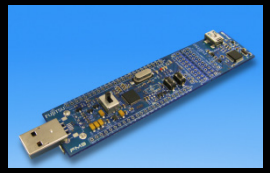
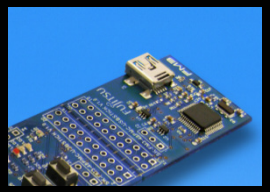
KEIL µVision – Menu Bars (1)

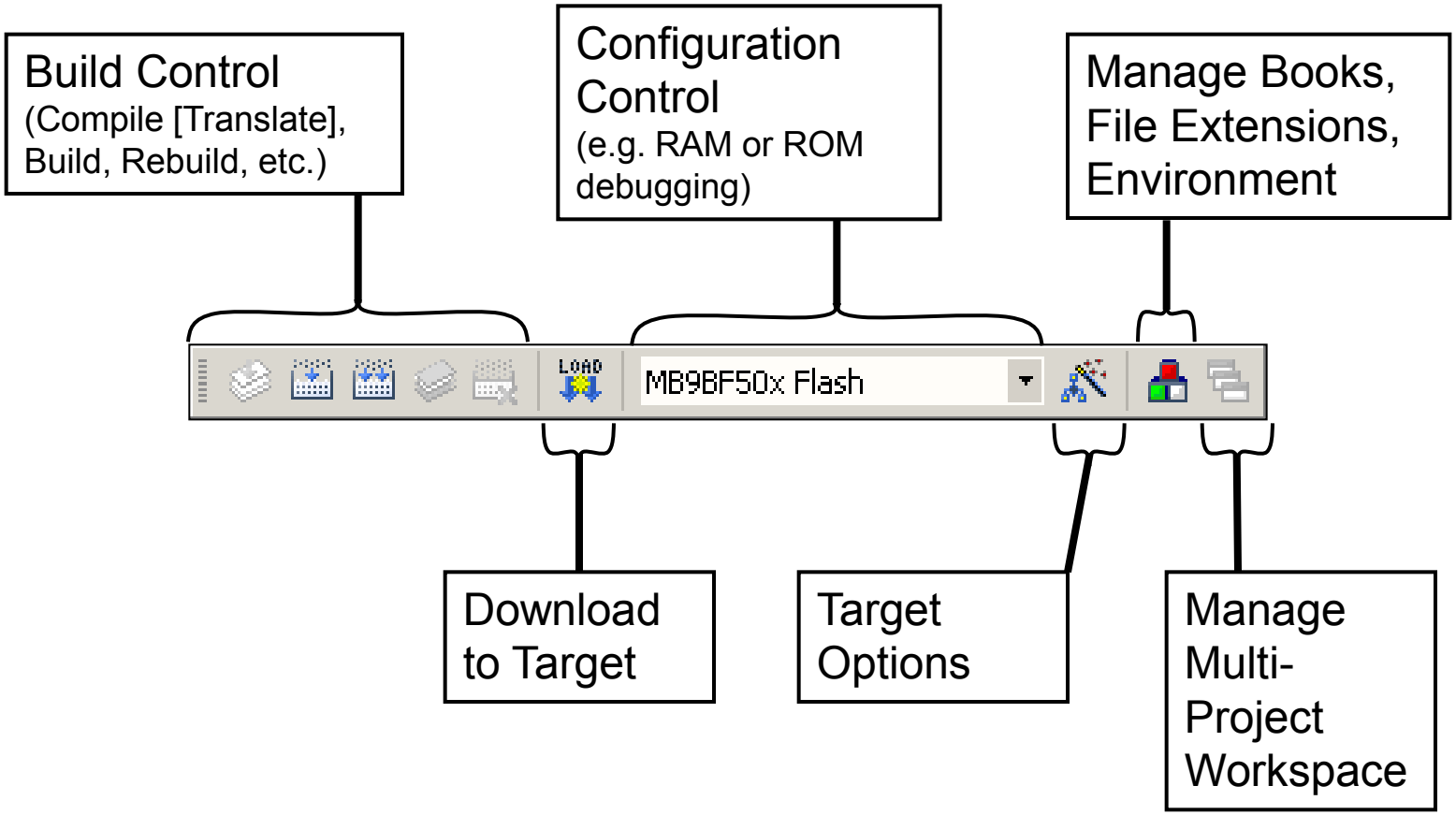
- **Menu Bar 1**
  - Can be moved in bar window area or set floating



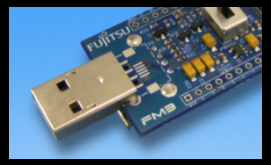
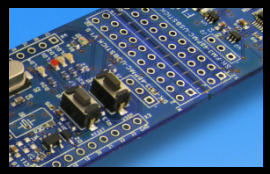
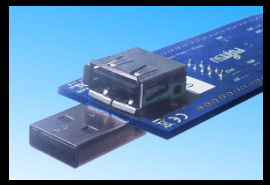
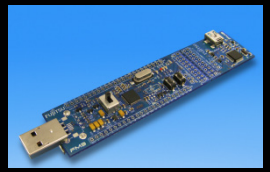
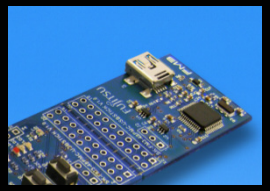
KEIL µVision – Menu Bars (2)

- **Menu Bar 2**
  - Can be moved in bar window area or set floating



KEIL µVision – Project Window

- **µVision Project Window**

Project Name

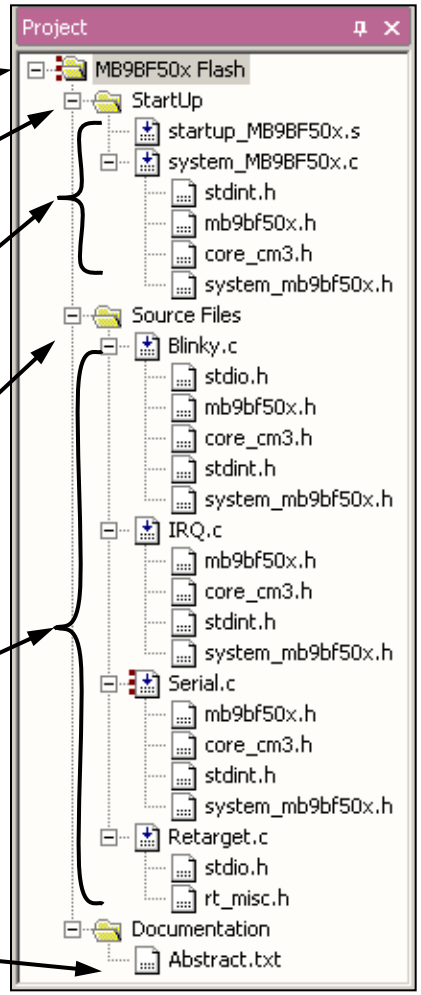
Startup Code Subfolder

Startup Code Source and HeaderFiles

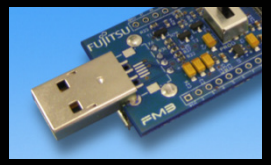
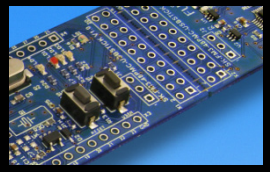
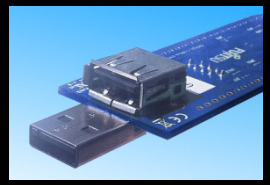
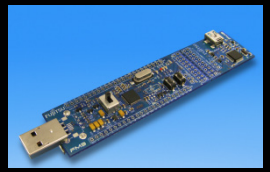
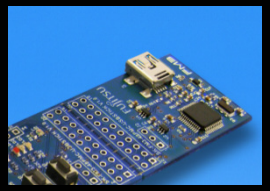
Main Project Code Subfolder

Main Project Code Source and Header Files

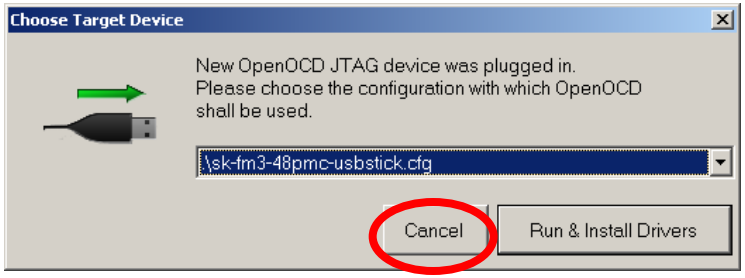
Project Description Subfolder and Abstract File



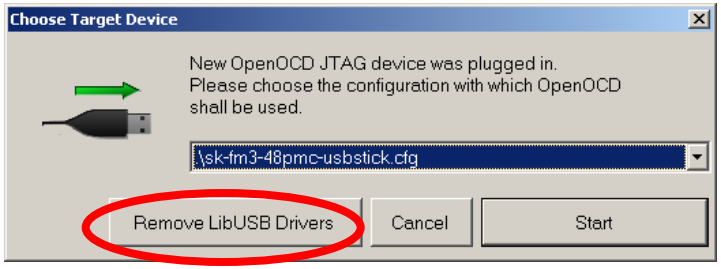
KEIL µVision – Setup OpenOCD

- **Setup OpenOCD Debugger**
  - Deinstall drivers of OpenOCD Starter
  - (A) Cancel installation of drivers

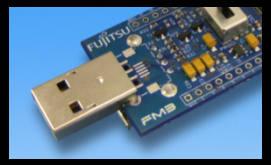
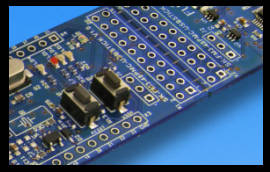
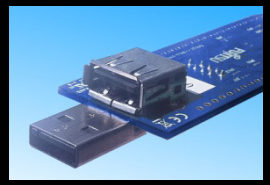
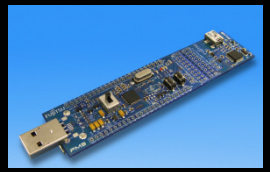
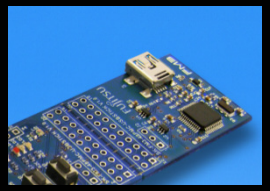


  - (B) deinstall drivers at evaluation board connection

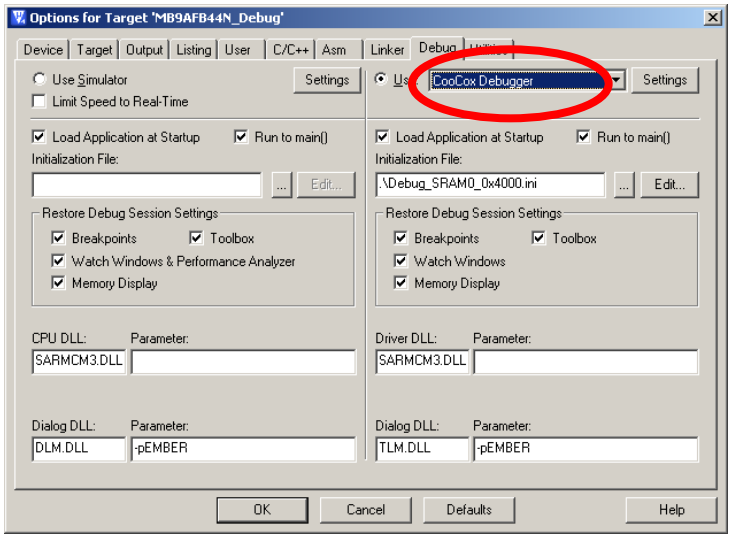


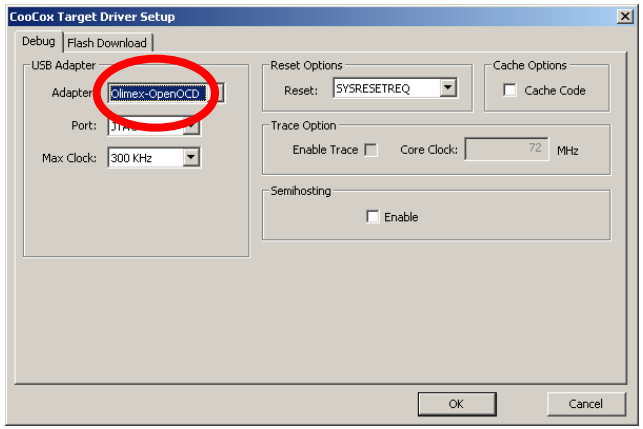
  - Install Colink Plugin for Keil RealView MDK (for OpenOCD usage) http://www.coocox.net/CoLinkGuide/CoMDKPlugin.html

KEIL µVision – Setup OpenOCD

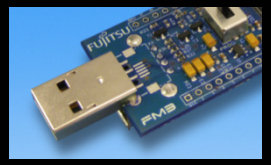
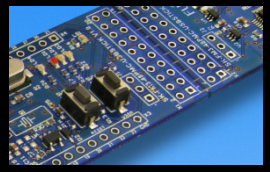
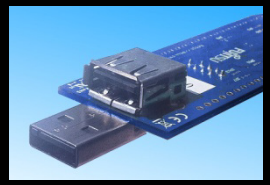
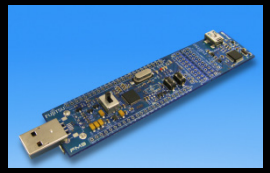
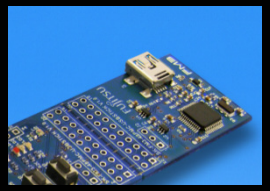






- **Setup OpenOCD Debugger**
  - Open Project Settings
    Project→Options for Target ‚MB9AF312K_...'...
  - Select *Debug* Tab
  - Select *CooCox Debugger*
  - Click *Settings*
  - Choose Adapter *Olimex-OpenOCD*

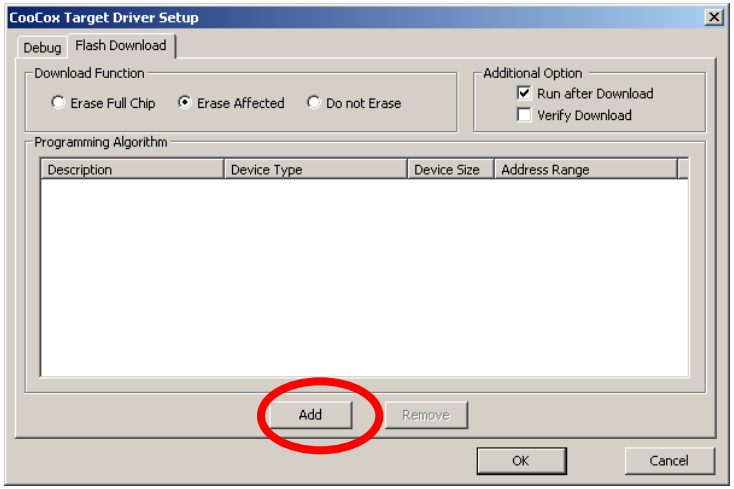


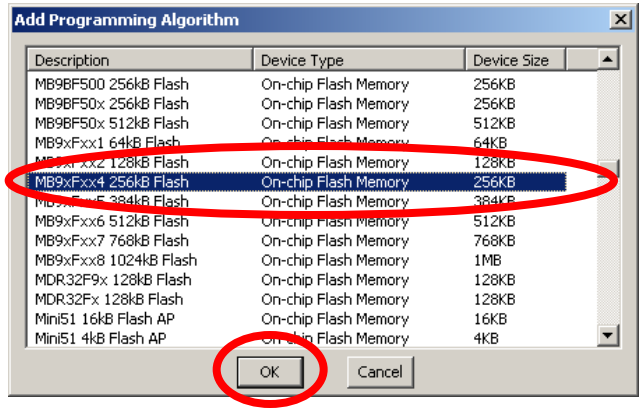


KEIL µVision – Setup OpenOCD

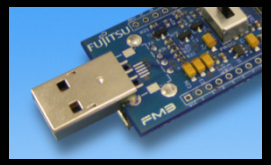
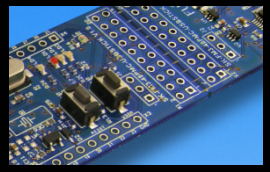
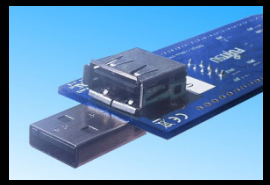
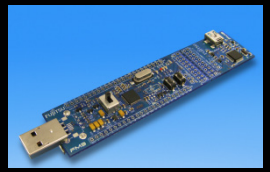
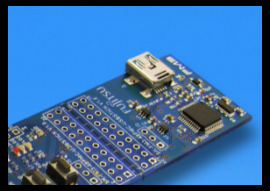






- **Setup OpenOCD Debugger (continued)**
  - Choose *Flash Download* Tab
  - Click *Add*
  - Choose *MB9xFxx2* device
  - Click *OK*

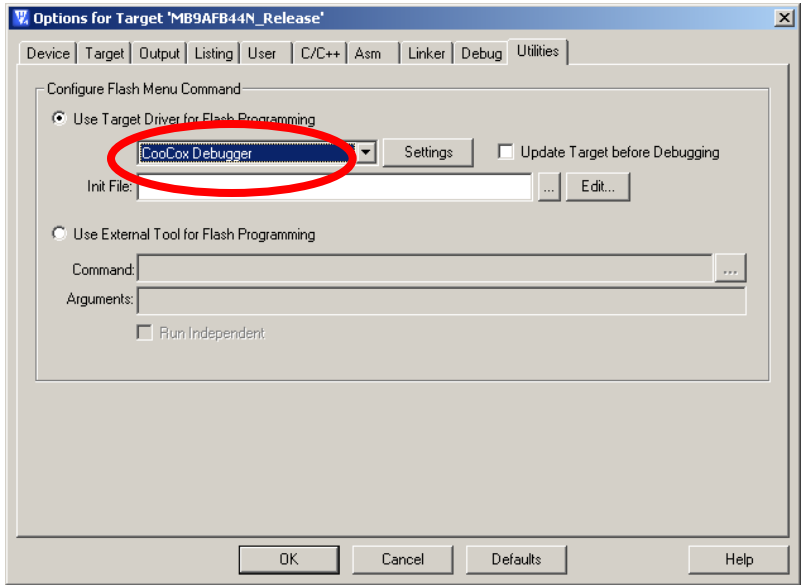




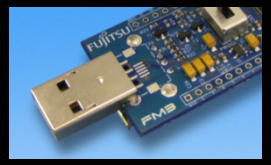
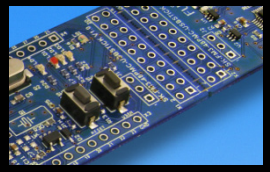
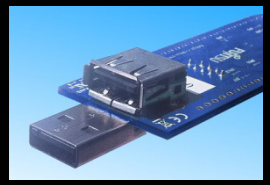
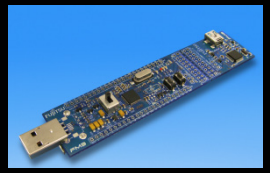
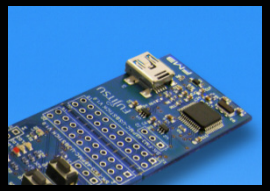
KEIL µVision – Setup OpenOCD

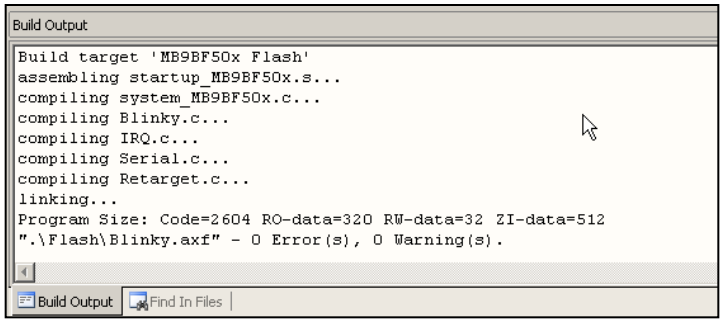
- **Setup OpenOCD Debugger (continued)**
  - Open Project Settings
    Project→Options for Target ‚MB9AF312K_...'...
  - Select *Utilities*Tab
  - Select *CooCox Debugger*
  - Click *Settings*



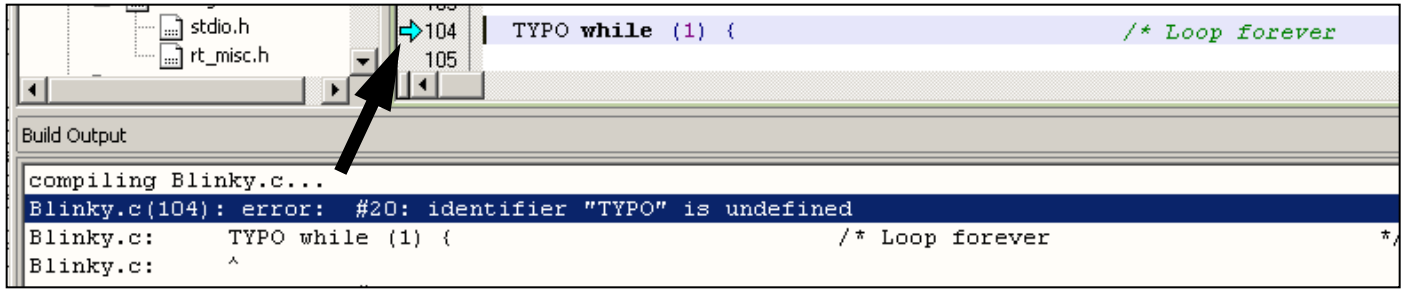
KEIL µVision – Making Project

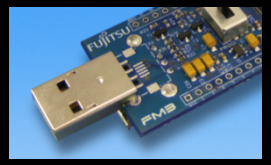
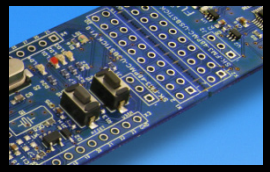
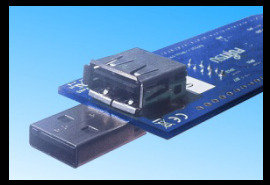
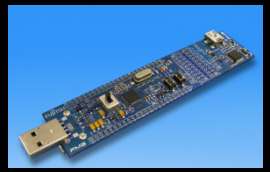
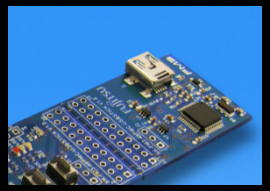






- **Making the Project**
  - Use Rebuild Icon ( ) or *Project→Rebuild all target files*
  - Check for no errors in Output window below



  - Build errors are shown in Output window.
    - Can be double-clicked by showing the source line with a blue arrow

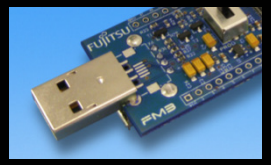
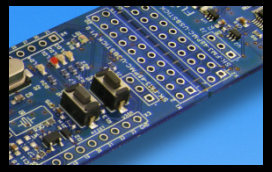
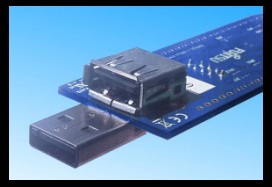
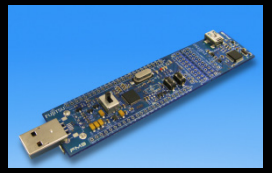
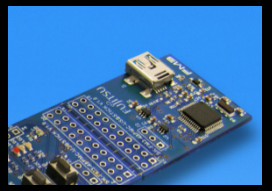


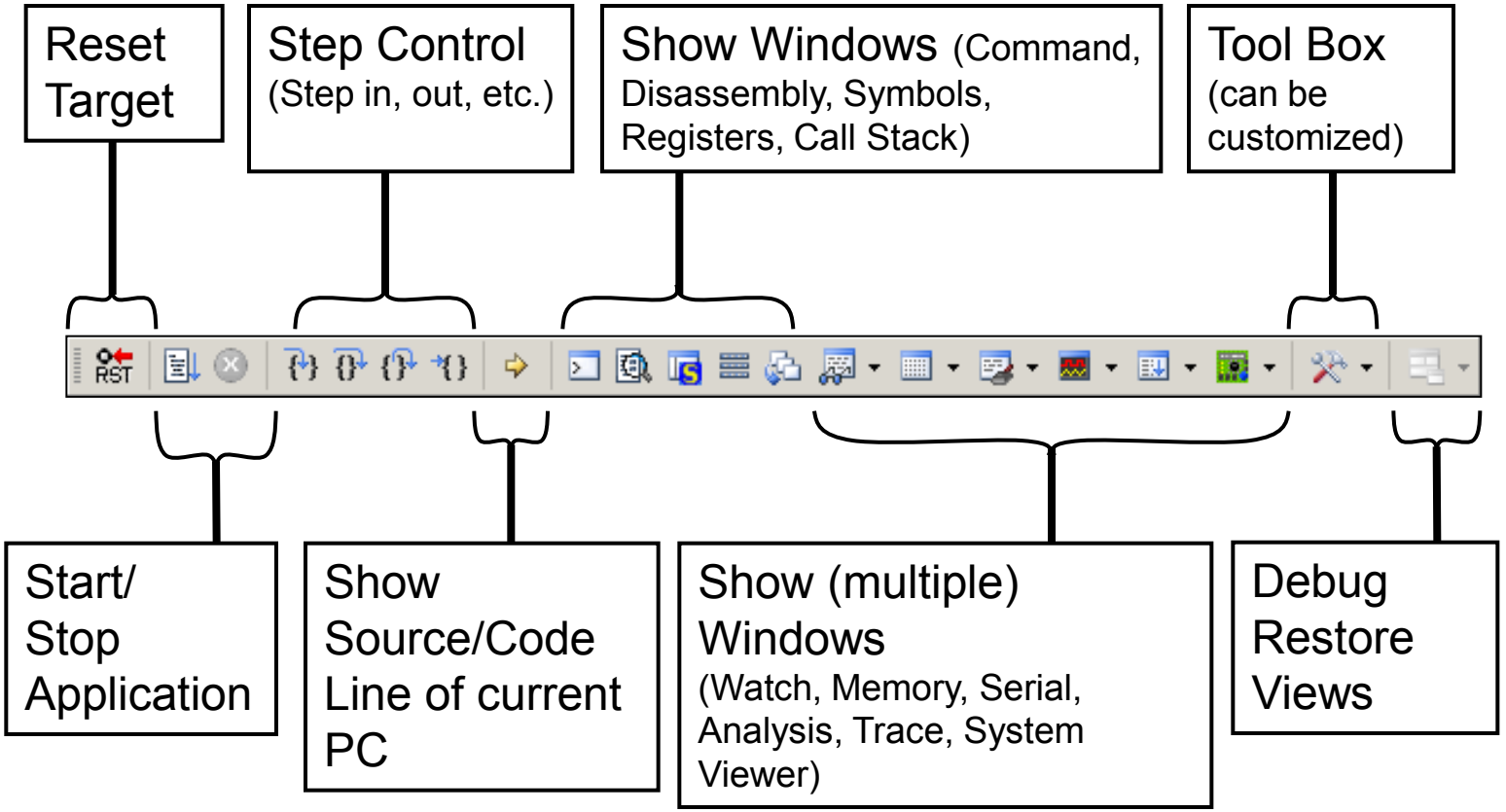
KEIL µVision – Debug (1)

- **Start Debugging**
  - Download to target first, when MCU Flash does not contain the current application openend and built in the IDE
    - Use Download Icon () or Menu: *Flash→Download*
  - Start Debug Session
    - Use Start/Stop Debug Icon () or Menu: *Debug→Start/Stop Debug Session*
  - Ending Debug Session
    - Use same way as for starting debug session

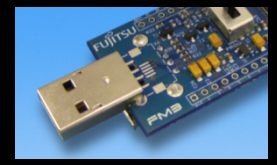
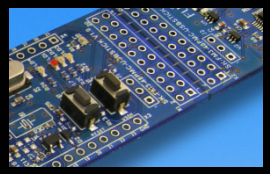
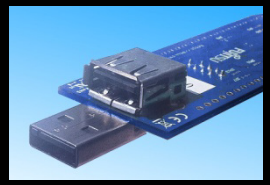
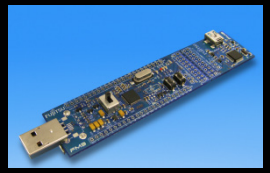
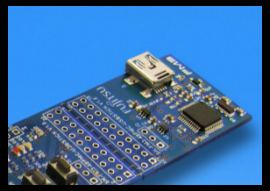
KEIL µVision – Debug (2)

- **Debugging Icon Bar**
  - During a Debug Session there will be visible a new icon bar



KEIL µVision – Debug (3)

- **Source View**
  - The Source windows do not change contents but get additional information

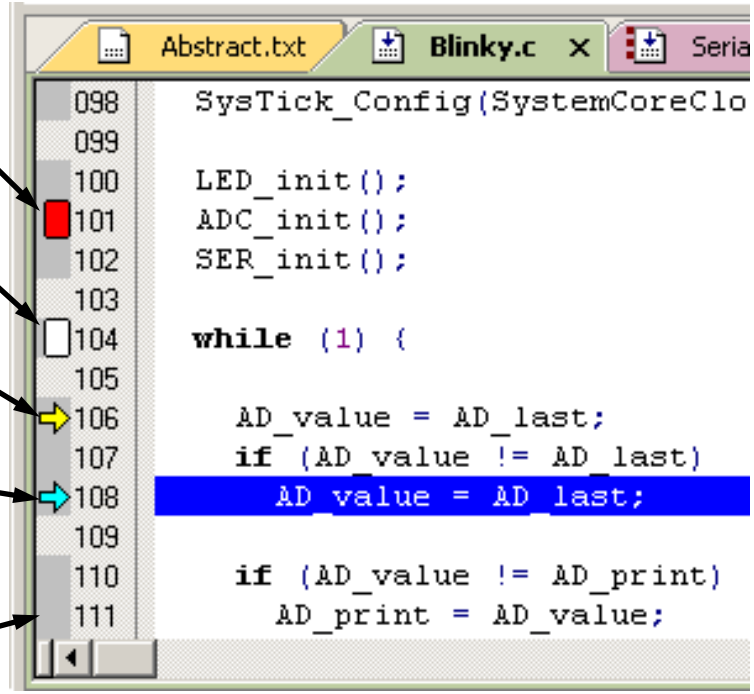
Active Breakpoint

Disabled Breakpoint

Current Program Counter

Current Cursor Line of Source Code

Code Lines with compiled Instructions (dark grey) ▯



KEIL µVision – Debug (4)

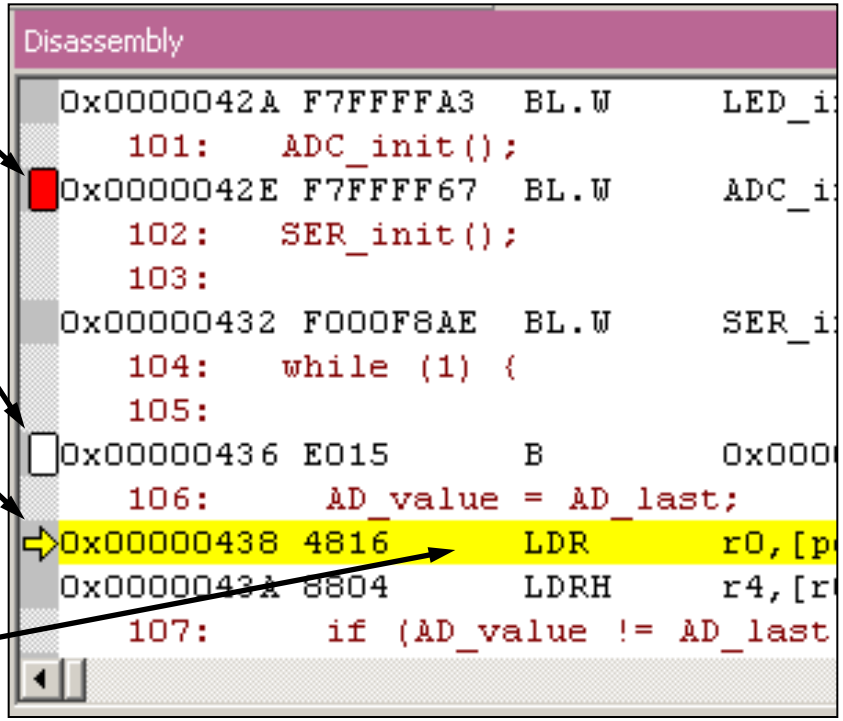
- **Disassembly View**
  - Mixed mode is selectable and deselectable

Active Breakpoint

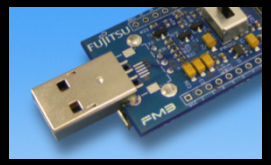
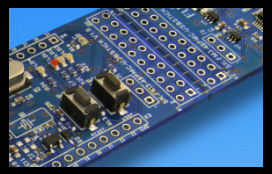
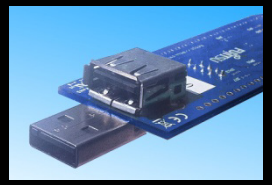
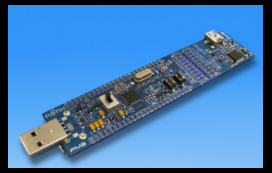
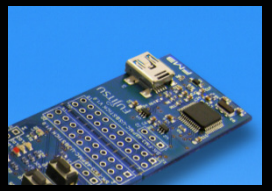
Disabled Breakpoint

Current Program Counter

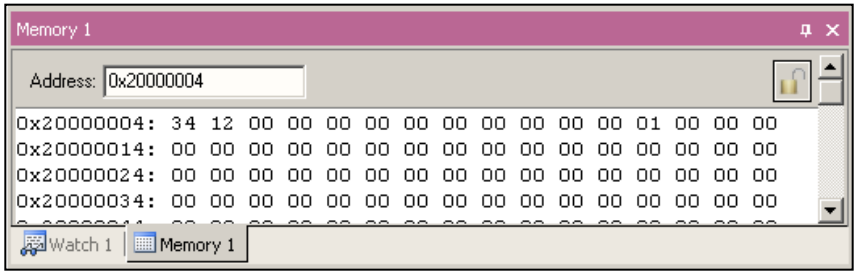
Current Cursor Line of Code highlighted in yellow background ( )



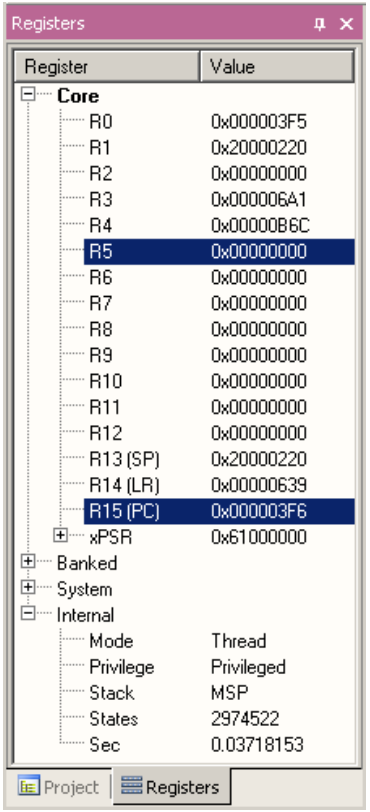
KEIL µVision – Debug (5)

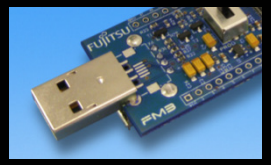
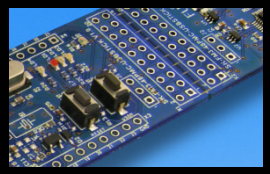
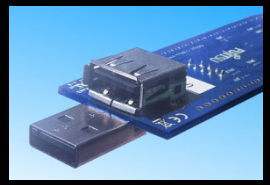
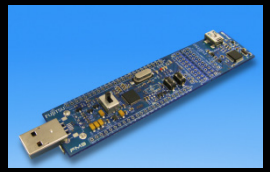
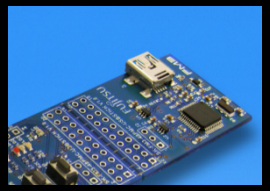
- **Memory Window**
  - Up to 4 Memory windows can be displayed in tabs
  - Memory is updated during runtime
  - Memory window tabs are shared with Watch windows



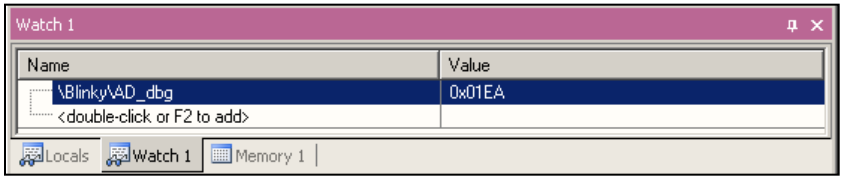
- **Register View**
  - Register view is a tab of the Project window
  - Changes are highlighted in dark blue text background
  - Register tree knots can be expanded



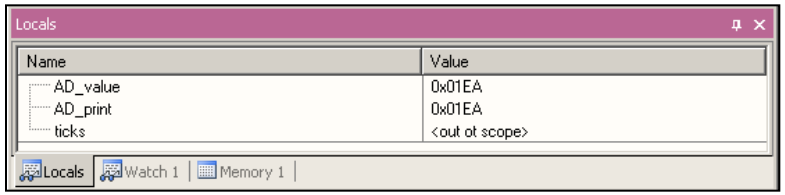
KEIL µVision – Debug (6)

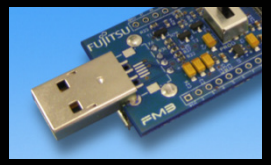
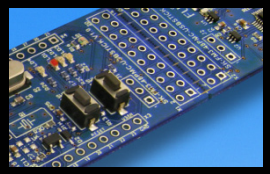
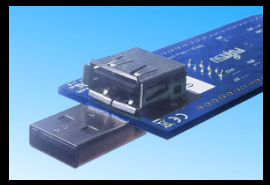
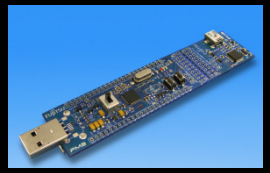
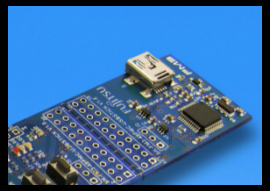
- **Variable Windows**
  - Watch Windows
    - Up to 2 Watch windows are sharing their tabs with e.g. Memory and Local views
    - Updated during runtime
    - Any changes are highlighted in dark blue text backround color
    - Displayed values can be changed by user during break



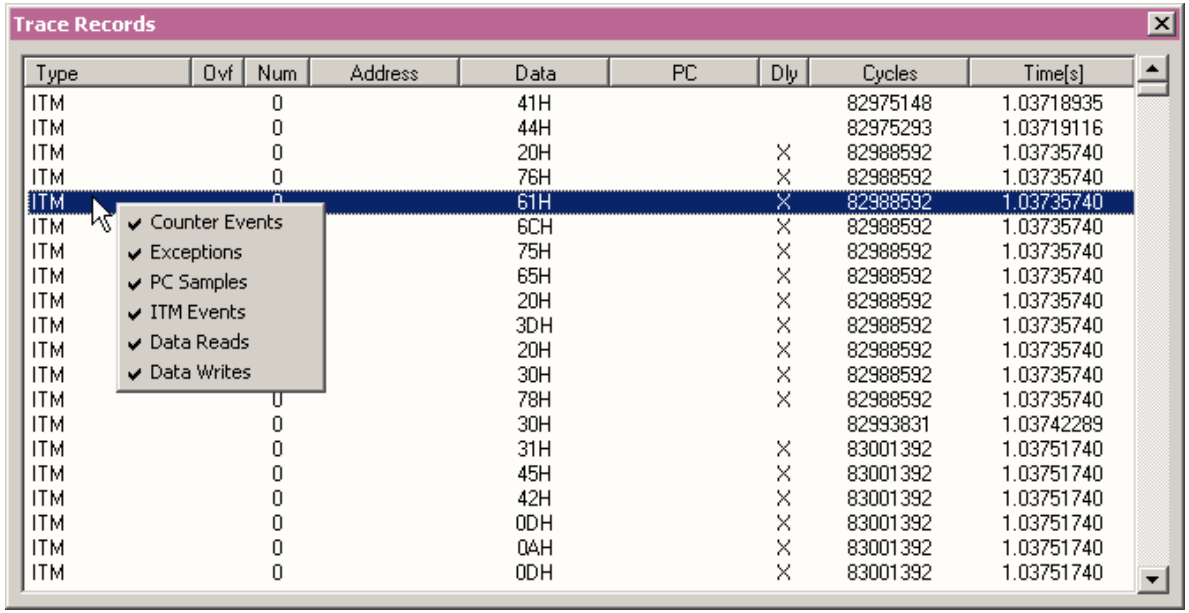
  - Local View
    - The local view shares the tab with e.g. Memory and Watch windows
    - Any changes are highlighted in dark blue text backround color
    - Displayed values can be changed by user during break



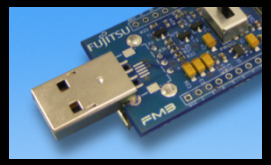
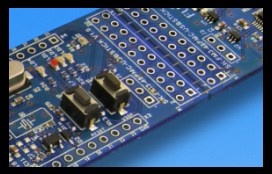
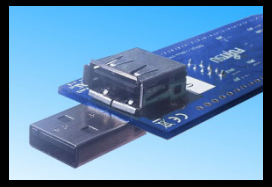
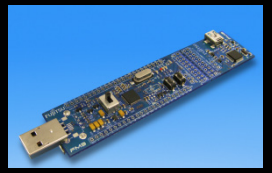
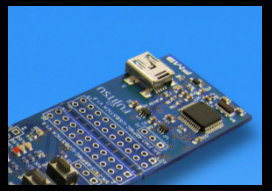
KEIL µVision – Trace (ULINK ME)

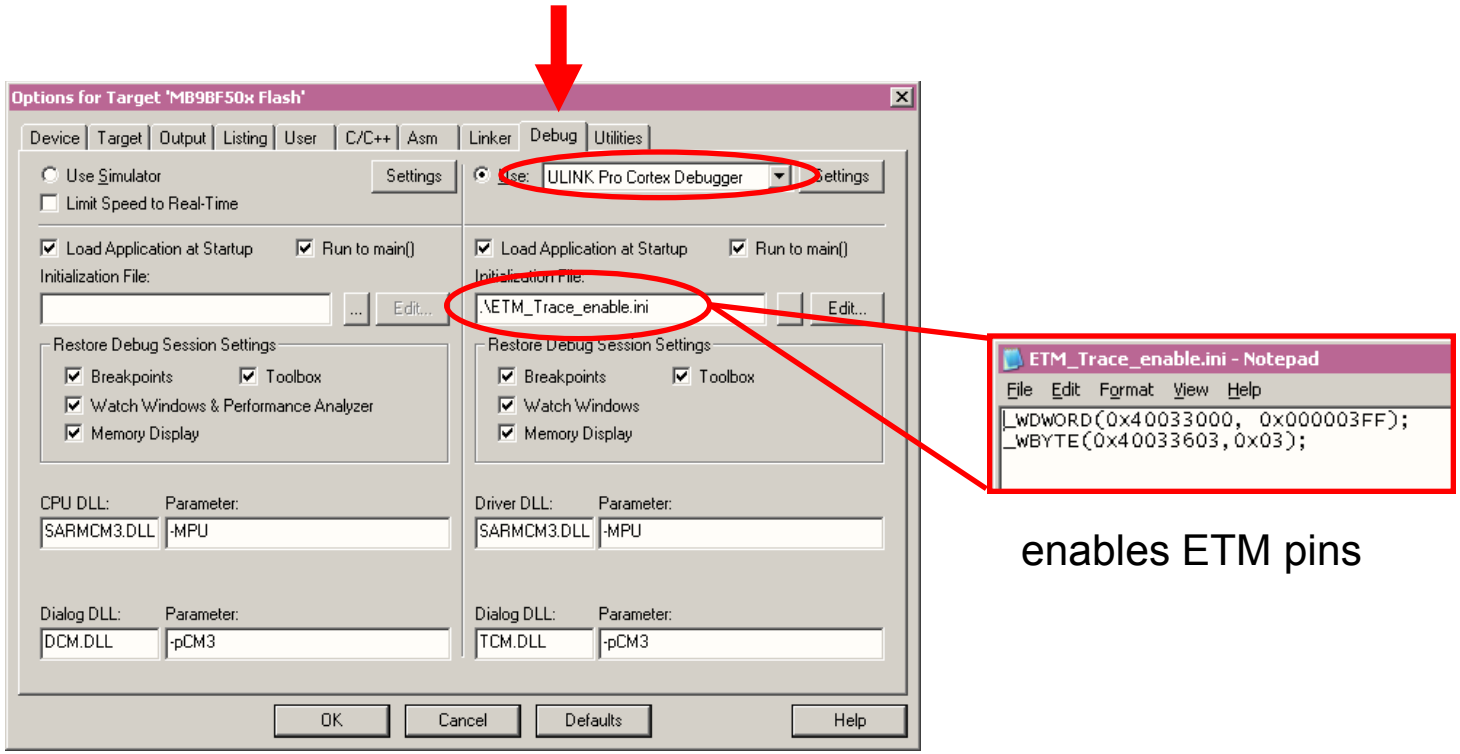
- **Trace via ITM**
  - Simple Trace views via Instrumentation Trace Macro is supported by µLINK ME
    - Records
    - Exceptions
    - Counters



KEIL µVision – Trace (ULINK Pro) (1)

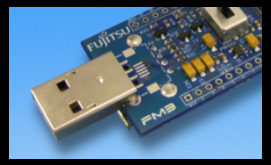
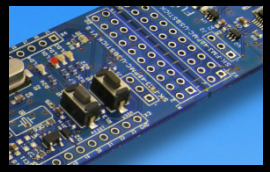
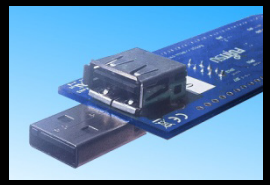
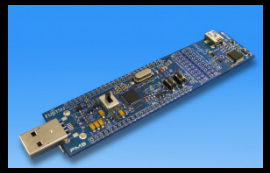
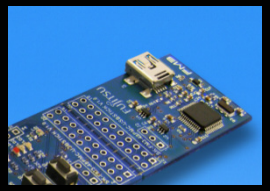






- **Trace via ETM**
  - Check settings in menu:
    Flash→Configure Flash Tools... Tab:*Debug*

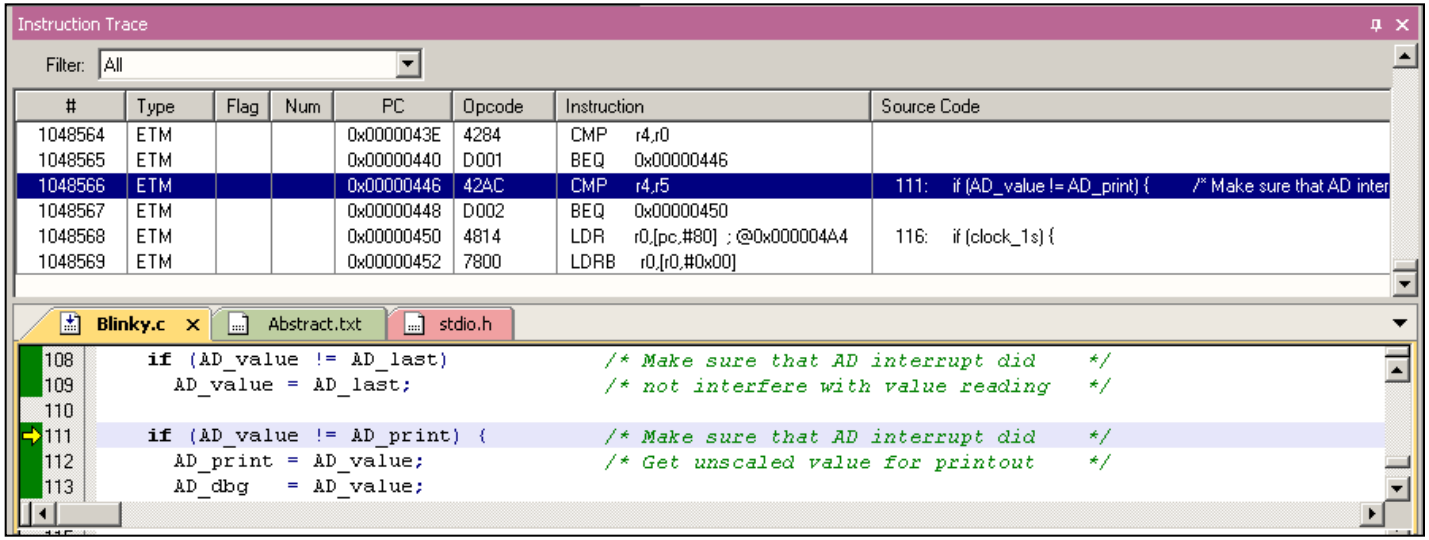


enables ETM pins

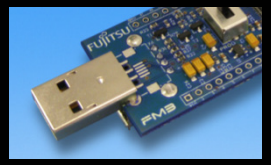
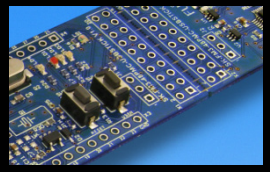
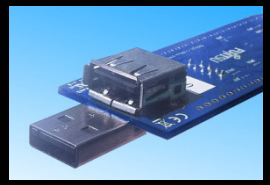
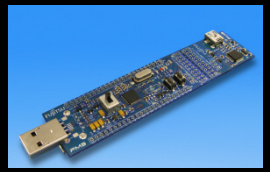
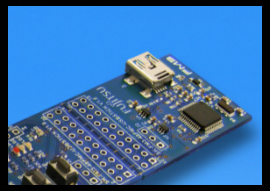
KEIL µVision – Trace (ULINK Pro) (2)

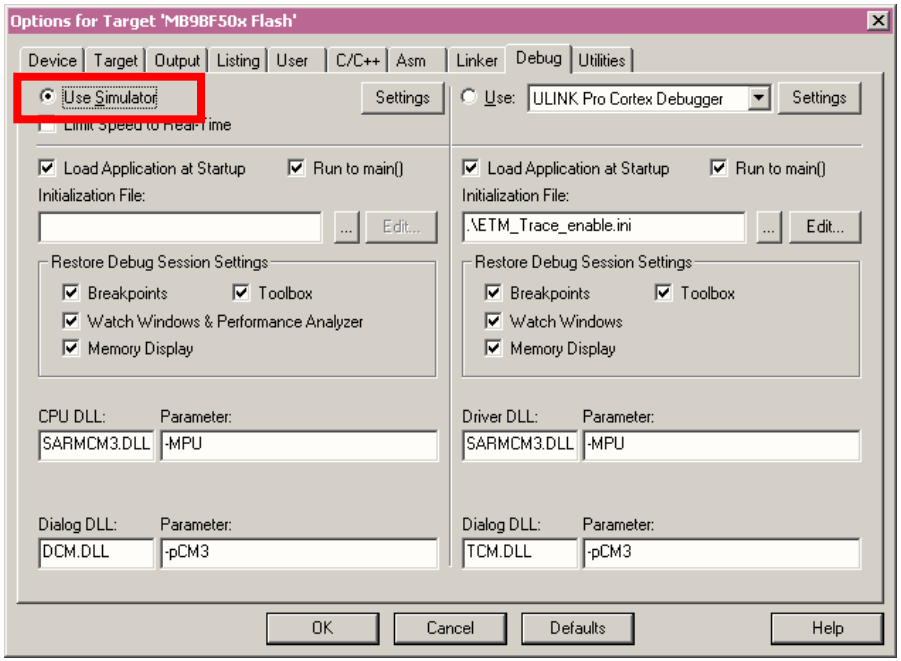
- **Instruction Trace**
  - Real Time Trace recording
  - Output can be filtered by several ETM and ITM events
  - Trace buffer is held in PC memory and transfered to µVision on break



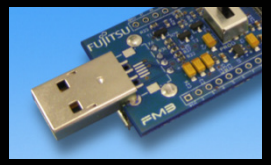
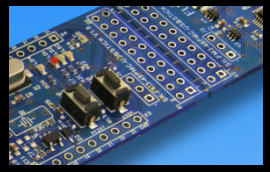
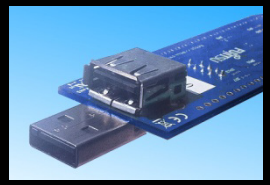
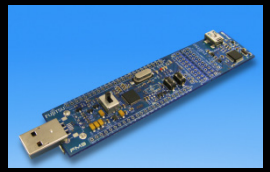
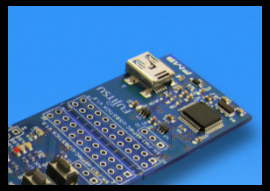
KEIL µVision – Simulator

- **Simulator**
  - The Core Simulator can be selected by the menu: *Flash→Configure Flash Tools...* and then choosing *Use Simulator*
  - Look & feel is like using ULINK debugger
  - Controlable also with **.ini* files



Support

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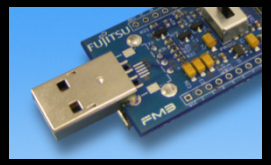
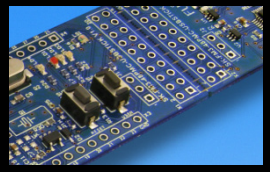
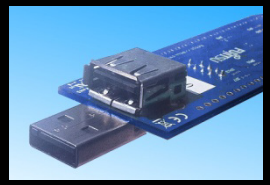
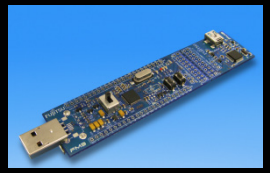
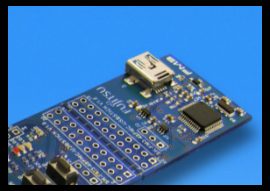
Further Steps

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  - See our software examples (Europe)
    - http://mcu.emea.fujitsu.com/mcu_product/mcu_all_software.htm

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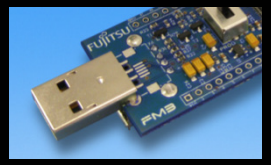
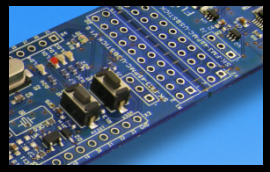
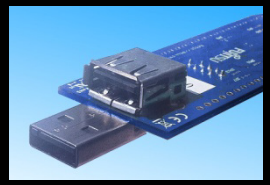
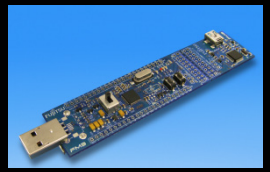
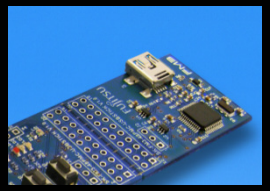
  - to register for our monthly FM3 seminar
  - to order the latest 'Fujitsu Micros DVD' containing all information regarding Fujitsu's 8-bit, 16-bit, and 32-bit microcontrollers

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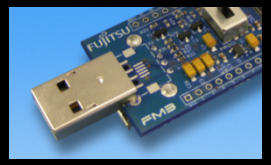
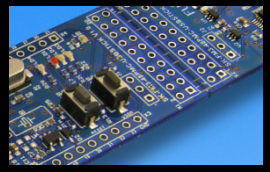
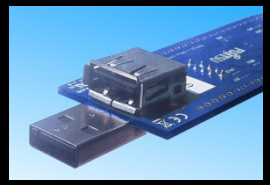
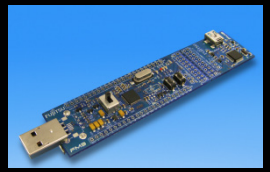
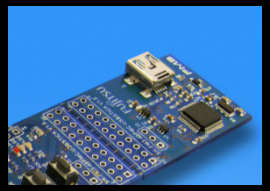
  - Contact: mcu_ticket.FSEU@de.fujitsu.com

Contacts – Distribution - Europe

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Rutronik Elektronische Bauelemente	www.rutronik.com
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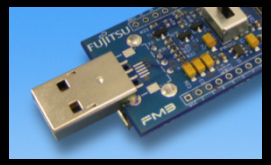
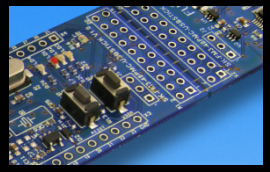
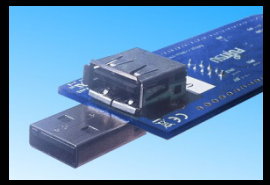
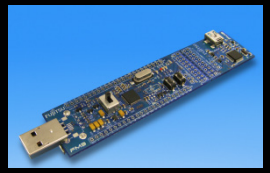
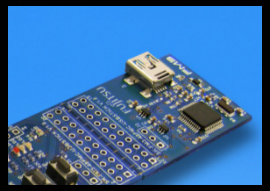






EG-Konformitätserklärung / EC declaration of conformity

CE

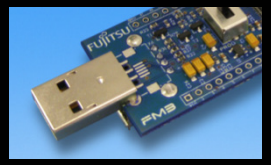
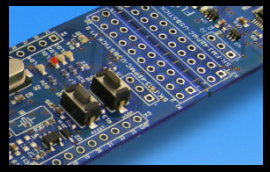
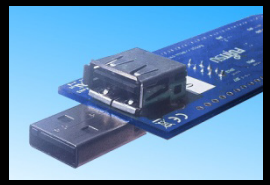
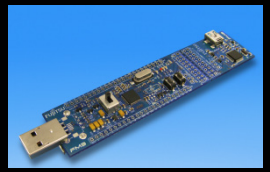
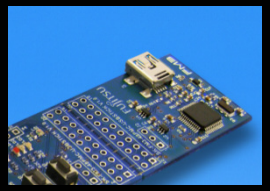
Hiermit erklären wir, Fujitsu Semiconductor Europe GmbH, Pittlerstrasse 47, 63225 Langen, Germany dass dieses Board aufgrund seiner Konzipierung und Bauart sowie in den von uns in Verkehr gebrachten Ausführung(en) den grundlegenden Anforderungen der EU-Richtlinie 2004/108/EC "Elektromagnetische Verträglichkeit" entspricht. Durch eine Veränderung des Boards (Hard- und/ oder Software) verliert diese Erklärung ihre Gültigkeit!

We, Fujitsu Semiconductor Europe GmbH, Pittlerstrasse 47, 63225 Langen, Germany hereby declare that the design, construction and description circulated by us of this board complies with the appropriate basic safety and health requirements according to the EU Guideline 2004/108/EC entitled 'Electro-Magnetic Compatibility'. Any changes to the equipment (hardware and/ or software) will render this declaration invalid!

Note:

All data and power supply lines connected to this starter kit should be kept as short as possible, with a maximum allowable length of 3m. Shielded cables should be used for data lines. As a rule of thumb, the cable length used when connecting external circuitry to the MCU pin header connectors for example should be less than 20cm. Longer cables may affect EMC performance and cause radio interference.

Recycling (Europe)

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  - Zur Entsorgung schicken Sie das Gerät bitte an die folgende Adresse:

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