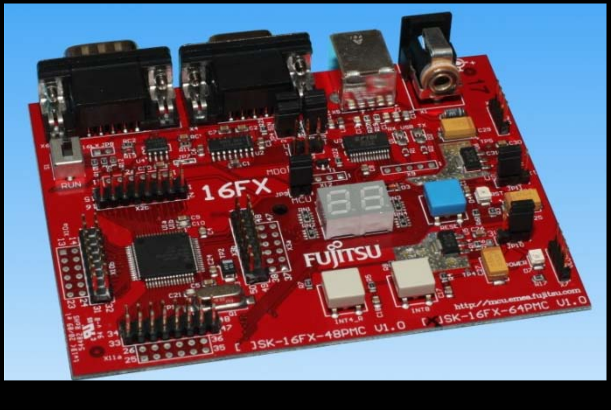
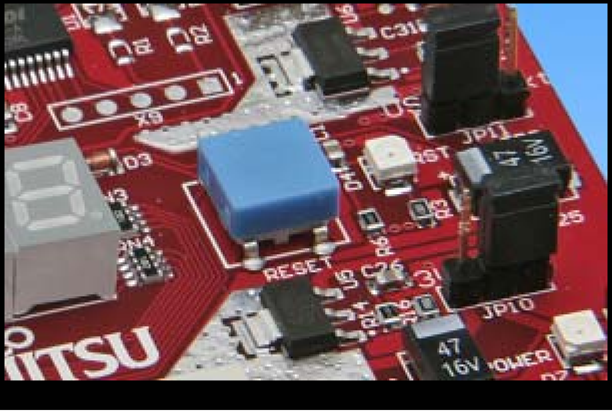




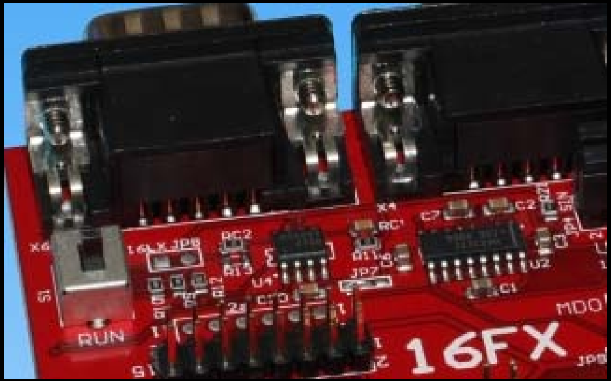
freeRTOS

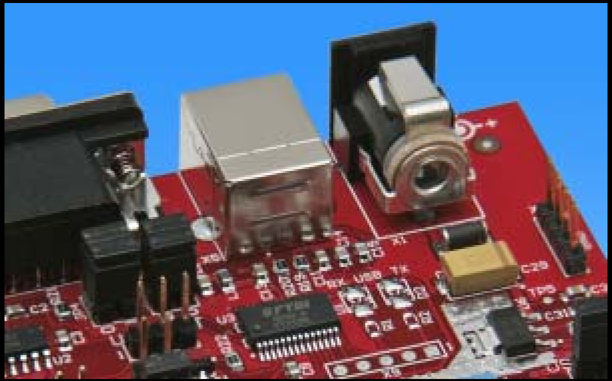
FUJITSU

Includes EUROScope lite16FX on-chip debugger

euros

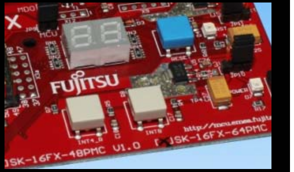
SK-16FX-64PMC

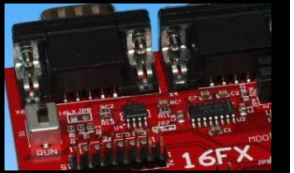


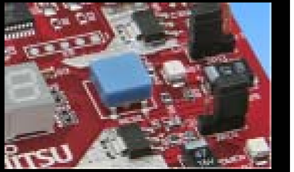


CD V1.1

Warranty and Disclaimer







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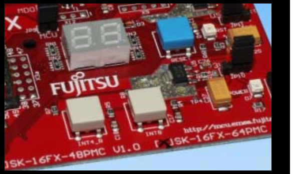
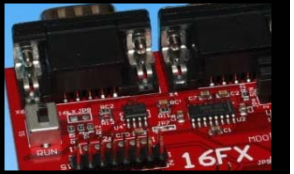
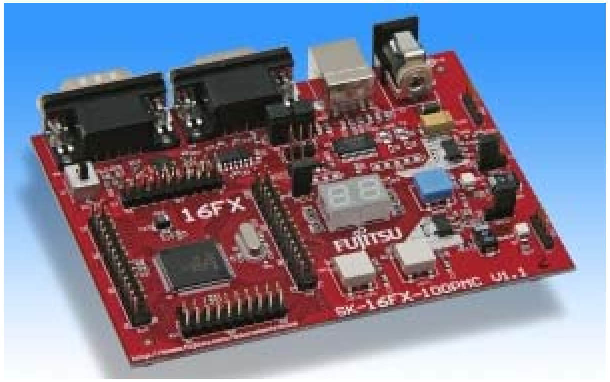



Overview

- **Introduction**
  - Warranty and Disclaimer
  - About the SK-16FX-64PMC
  - SK-16FX-64PMC content
  - Test it
  - The hardware
  - The software

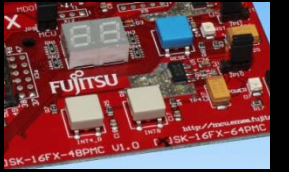
- **Try yourself**
  - Software examples
  - Program download
  - New project
  - EUROScope
  - FreeRTOS

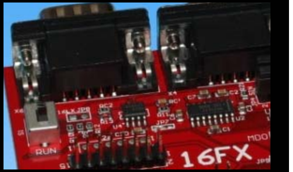
- **Optional tools**
- **Contacts**



- **Additional documents**
  - Schematic ‘SK-16FX-64PMC’
  - Data sheet MB96350 Series
  - Hardware manual 16FX Family
  - AppNote ‘16FX Hardware Setup’
  - AppNote ‘16FX Getting Started’
  - Customer Information 16FX
  - EUROScope Reference Manual
  - AppNote ‚EUROScope‘
  - Customer Information of ‚EUROScope‘ limitations

About the SK-16FX-64PMC

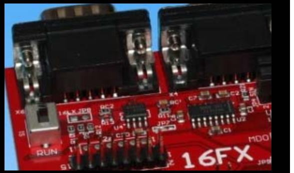




- **The SK-16FX-64PMC includes a low-cost evaluation board based on the Fujitsu 16FX microcontroller MB96350 Series**

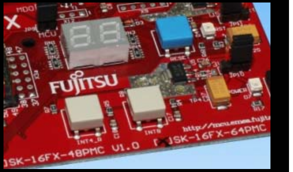
- **The MB96350 Series includes the following features:**
  - Up to 288 KByte Flash Memory
  - Up to 12 KByte RAM
  - Up to 2 CAN controller 2.0B
  - Up to 4 LIN-USART interfaces
  - 1x I^{2}C interface
  - Timers (ICUs, OCUs, PPGs, others)
  - ADC
  - External interrupts
  - Others

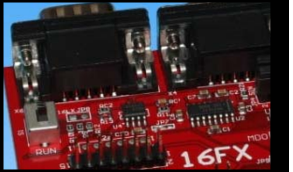
About the SK-16FX-64PMC



Features of the SK-16FX-64PMC (EUROScope) board:

- Microcontroller MB96F356RSB
- 1x UART-Transceiver (SUB-D9 connector)
- 1x USB to serial converter (Type-B connector)
- 1x High-speed CAN-Transceiver (SUB-D9 connector)
- 2x LED-Display (7-Segment)
- 2x ‘User’-buttons
- 1x ‘Reset’-button, ‘Reset’-LED
- All 64 pins routed to pin-header
- On-board 5V and 3V voltage regulators, ‘Power’-LED
- USB power-supply (external power supply possible)

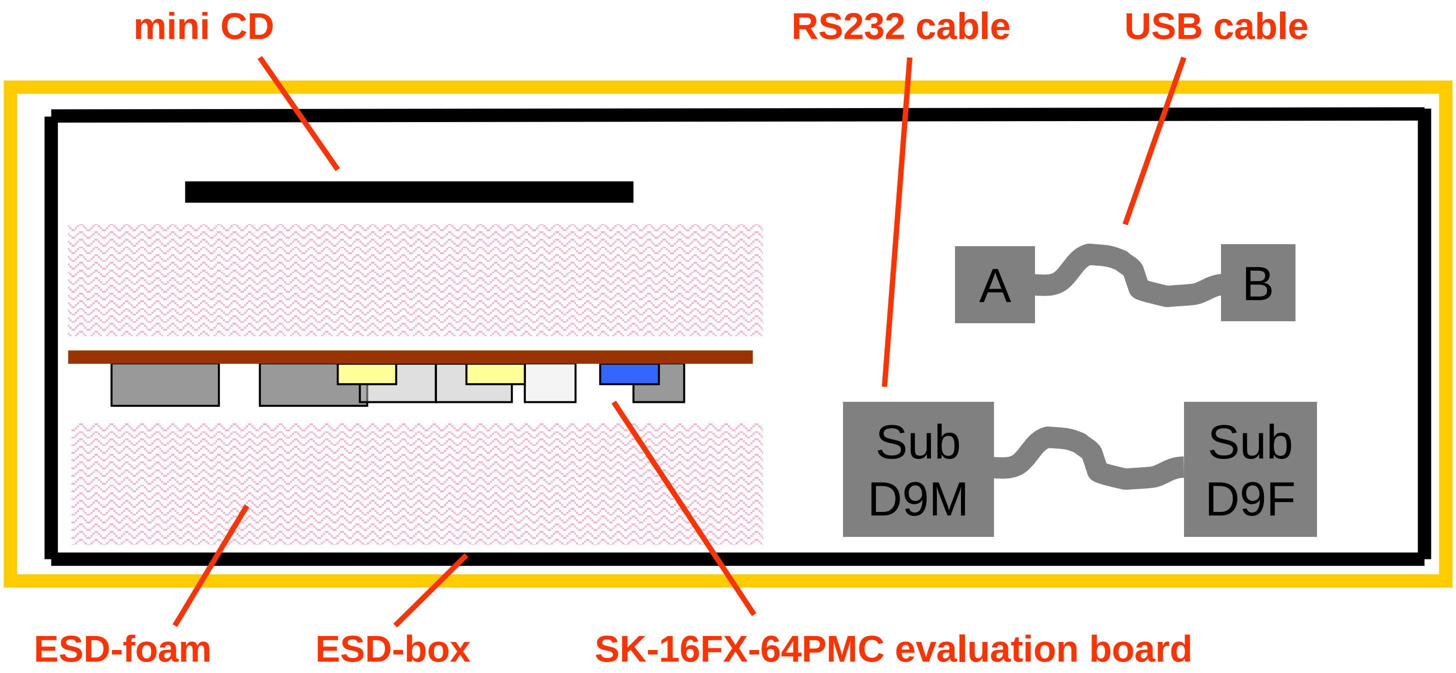




SK-16FX-64PMC content

The SK-16FX-64PMC contains

- SK-16FX-64PMC evaluation board with MB96F356RSB
- USB cable, RS232 cable
- Mini CD
  - Documentation, USB driver, Softune Workbench, Examples
  - „EUROScope lite 16FX“



mini CD

RS232 cable

USB cable

A

B

Sub D9M

Sub D9F

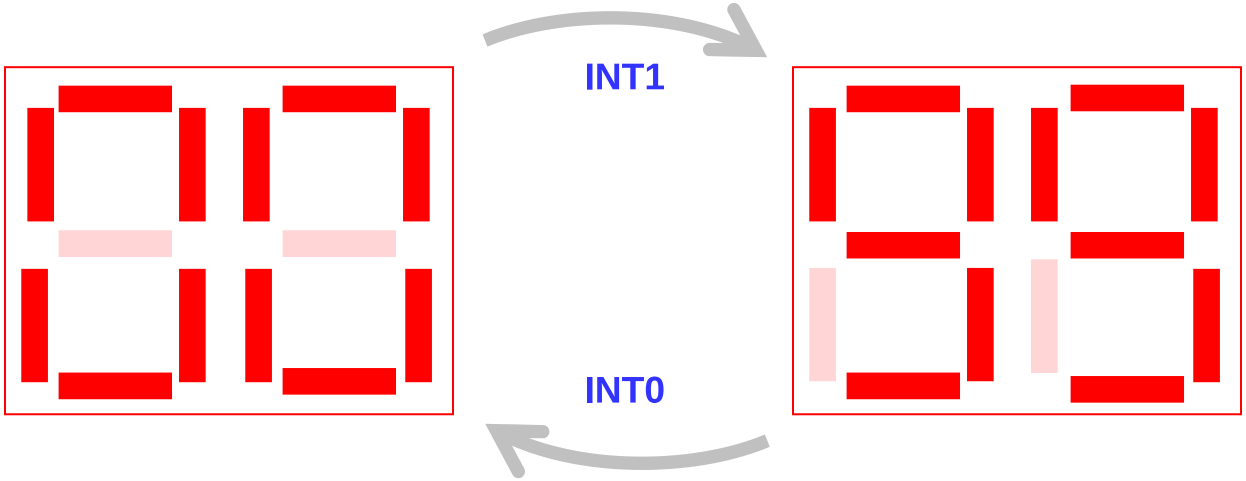
ESD-foam

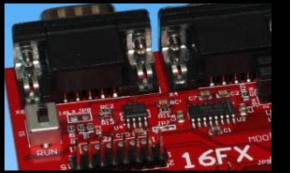
ESD-box

SK-16FX-64PMC evaluation board

Test it

- **The microcontroller on the SK-16FX-64PMC is already preprogrammed with a simple application.**
  - Connect the USB cable to your PC and the SK-16FX-64PMC
  - Install the USB driver from the CD
  - Press the ‚Reset‘- Button
  - The SK-16FX-64PMC will automatically start counting
  - The count direction can be changed by pressing the key buttons





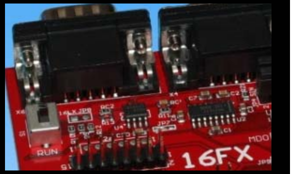
Test it

Congratulations!

- **You finished successfully the first test**

- **Now you will get more details about the SK-16FX-64PMC**
- **You will learn more about**
  - The on-board features
  - How to program the Flash
  - How to start your own application
  - On-chip debugging with EUROScope

The Hardware



- **Main features**

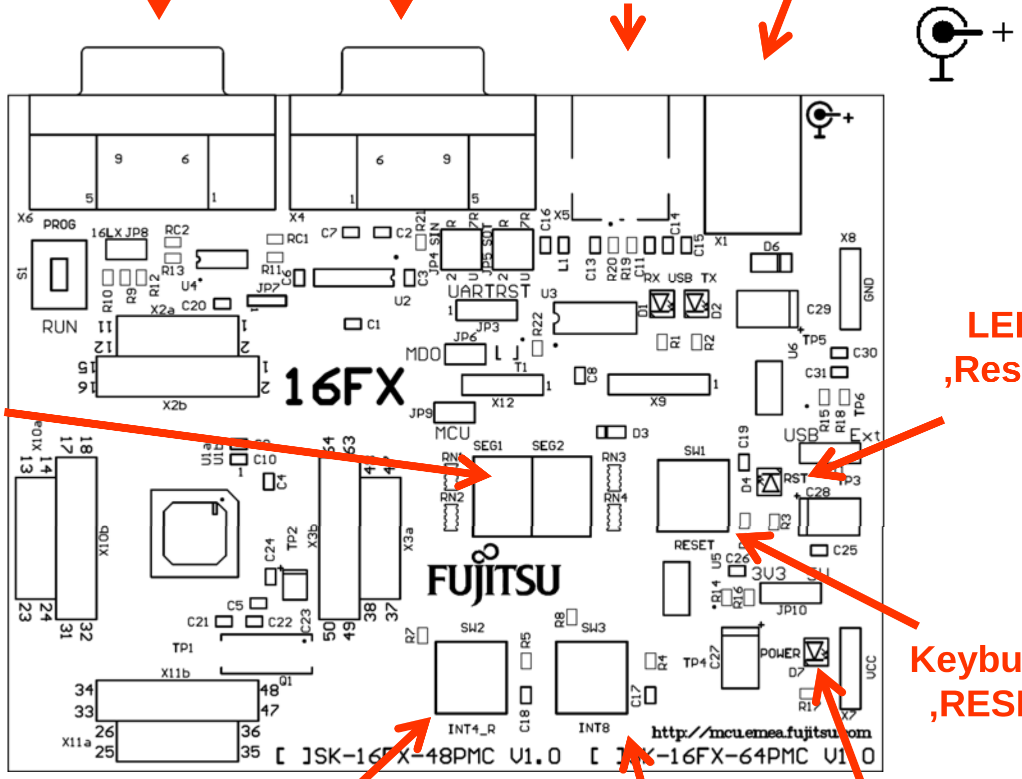
CAN

UART ‚A‘

USB to UART ‚B‘

Ext. Power

+6V ... +9V



LED ‚Reset‘

Keybutton ‚RESET‘

LED ‚Power‘

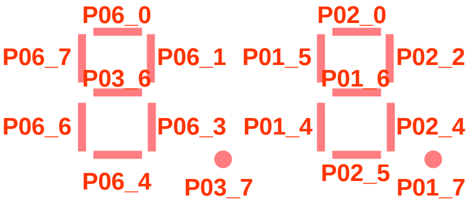
Keybutton ‚INT4_R‘

Port P05_6

Keybutton ‚INT8‘

Port P00_0

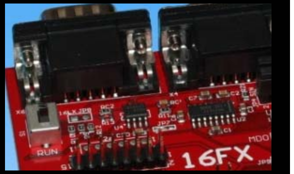
7-Segment Display



SEG1: Port06 and Port03

SEG2: Port02 and Port01

The Hardware



The jumpers

JP4: UART RX select

R-7R: UART7_R=UART‘A‘ / U-2: UART2=UART‘B‘ (USB)

R-2: UART2=UART‘A‘ / U-7R: UART7_R=UART‘B‘ (USB)

JP5: UART TX select

R-7R: UART7_R=UART‘A‘ / U-2: UART2=UART‘B‘ (USB)

R-2: UART2=UART‘A‘ / U-7R: UART7_R=UART‘B‘ (USB)

S1: Mode selection

PROG: Select the program-mode

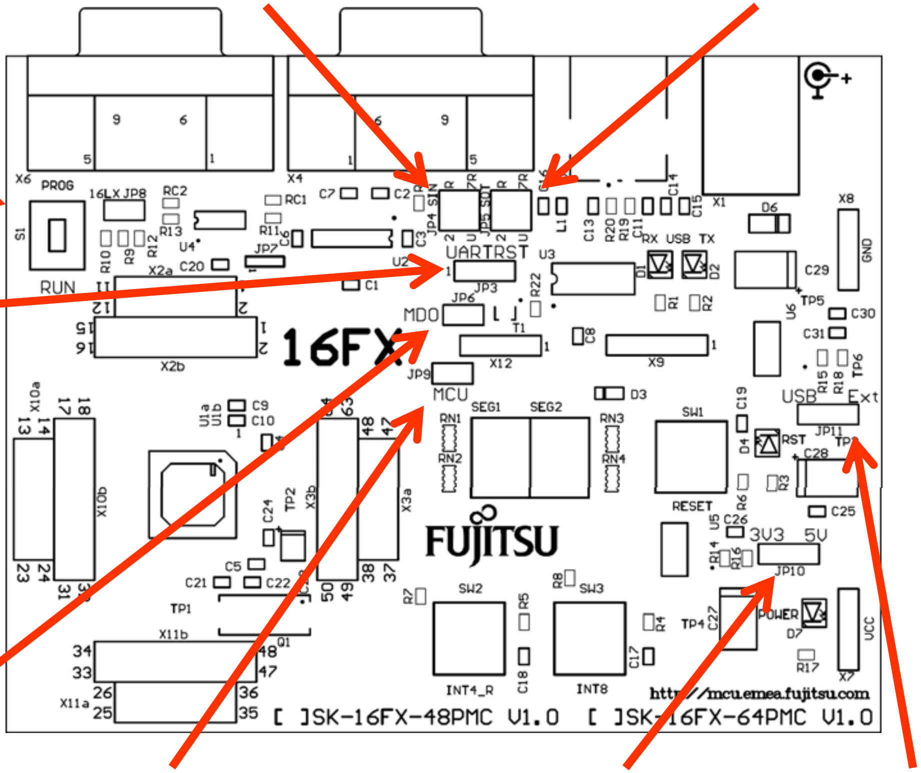
RUN: Select the run-mode

JP3: DTR-Reset

Set the jumper to 1-2 to connect the DTR-Signal of the UART connector to the microcontroller reset-pin.

Set the jumper to 2-3 to connect the DTR-Signal of the USB connector to the microcontroller reset-pin.

Some terminal-programs, e.g. Fujitsu‘s Skwizard, allow to reset the evaluation board by using the DTR-Signal.



JP6: MD0 selection

Close this jumper to control the MD0 level by the RTS signal of the USB interface

JP9: MCU Vcc

This jumper can be used to measure the current consumption of the MCU

JP10: 5V / 3.3V

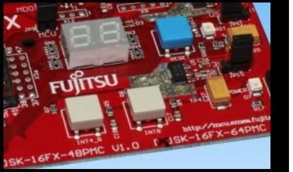
1-2: 5V supply is used

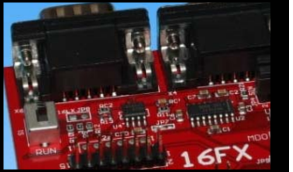
2-3: 3.3V supply is used

JP11: Power Supply

1-2: USB supply is used

2-3: External supply is used



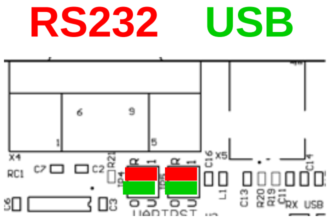


The Hardware

JP4, JP5 : UART selection

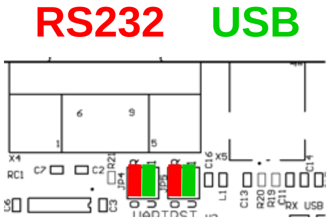
- UART2 and UART7_R of the microcontroller can be used together with a typical RS232 SUB-D9 connector and a serial/USB converter
- The jumpers JP4 and JP5 routes the channel to the connector

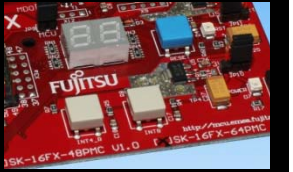
- UART2 = USB-connector (X5), UART7_R = Sub-D9 (X4) (default)
  - Setting of Jumper JP4 and JP5: U-2 / R-7R

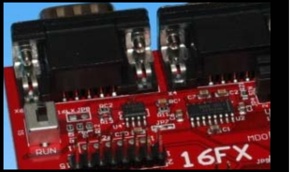


(default)

- UART2 = Sub-D9 (X4), UART7_R = USB-connector (X5)
  - Setting of Jumper JP4 and JP5: U-7R / R-2







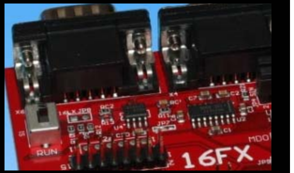
The Hardware

The microcontroller pins

Pin	Pin-name	SK-16FX-64PMC
1	AVss	GND
2	AVRH	MCUVCC / VCC
3	P06_2/AN2/PPG2/CS2_R	
4	P06_3/AN3/PPG3/CS3_R	SEG1-C
5	P06_4/AN4/PPG4/CS4_R	SEG1-D
6	P06_5/AN5/PPG5/CS5_R	
7	P06_6/AN6/PPG6	SEG1-E
8	P06_7/AN7/PPG7	SEG1-F
9	P05_0/AN8/SIN2/INT3_R1	UART2 (RXD)
10	P05_1/AN9/SOT2	UART2 (TXD)
11	P05_2/AN10/SCK2	
12	P05_3/AN11/TIN3/WOT	
13	P05_4/AN12/TOT3/INT2_R	
14	P05_5/AN13/INT0_R/NMI_R	
15	P05_6/AN14/INT4_R	Key button ‘INT4_R’
16	P04_2/IN6/RX1/INT9_R/TTG6/TTG14	

Pin	Pin-name	SK-16FX-64PMC
17	P04_3/IN7/TX1/TTG7/TTG15	
18	Vss	GND
19	P04_0	
20	P04_1	
21	MD2	GND (w/ JP8 to VCC)
22	MD1	VCC
23	MD0	Mode-Switch S1
24	P00_0/AD00/INT8/SCK7_R/TTG8_R	Key button ‘INT8’
25	P00_1/AD01/INT9/SOT7_R/TTG9_R	UART7_R (TXD)
26	P00_2/AD02/INT10/SIN7_R/TTG10_R	UART7_R (RXD)
27	P00_3/AD03/INT11/SCK8_R/TTG11_R	
28	P00_4/AD04/INT12/SOT8_R/PPG8_R	
29	P00_5/AD05/INT13/SIN8_R/PPG9_R	
30	P00_6/AD06/INT14/PPG10_R	
31	P00_7/AD07/INT15/PPG11_R	
32	P01_0/AD08/CKOT1/TIN1/TTG16_R	

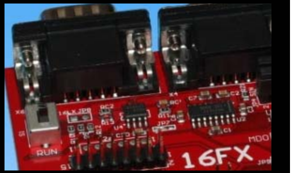
The Hardware



The microcontroller pins (cont‘d)

Pin	Pin-name	SK-16FX-64PMC
33	P01_1/AD09/CKOTX1/TOT1/TTG17_R	
34	P01_2/AD10/INT11_R/SIN3/TTG18_R	
35	P01_3/AD11/SOT3/TTG19_R	
36	P01_4/AD12/SCK3/PPG16_R	SEG2-E
37	P01_5/AD13/SIN2_R/INT7_R/PPG17_R	SEG2-F
38	P01_6/AD14/SOT2_R/PPG18_R	SEG2-G
39	P01_7/AD15/SCK2_R/PPG19_R	SEG2-DP
40	P02_0/A16/PPG12/CKOT1_R	SEG2-A
41	P02_1/A17/PPG13	
42	P02_2/A18/PPG14/CKOT0_R	SEG2-B
43	P02_3/A19/PPG15	
44	P02_4/A20/TTG8/TTG0/IN0	SEG2-C
45	RSTX	Key button ‘Reset’
46	X1	4 MHz Crystal
47	X0	4 MHz Crystal
48	Vss	GND

Pin	Pin-name	SK-16FX-64PMC
49	Vcc	MCUVCC / VCC
50	C	‘C’ capacitors
51	P02_5/A21/TTG9/TTG1/IN1/ADTG_R	SEG2-D
52	P04_4/SDA0/FRCK0/TIN0_R	
53	P04_5/SCL0/FRCK1/TIN2_R	
54	P03_0/ALE/IN4/TTG4/TTG12/TOT0_R	
55	P03_1/RDX/IN5/TTG5/TTG13/TOT2_R	
56	P03_2/WR(L)X/RX2/INT10_R	CAN2 (RX)
57	P03_3/TX2/WRHX	CAN2 (TX)
58	P03_4/HRQ/OUT4	
59	P03_5/HAKX/OUT5	
60	P03_6/RDY/OUT6	SEG1-G
61	P03_7/ECLK/OUT7	SEG1-DP
62	P06_0/AN0/PPG0/CS0_R	SEG1-A
63	P06_1/AN1/PPG1/CS1_R	SEG1-B
64	AVcc	MCUVCC / VCC



The Software

- **The SK-16FX-64PMC CD includes the following software:**
  - Softune Workbench (development platform for Fujitsu microcontroller)
  - MCU Flash programming tool and SKwizard terminal program
  - USB driver for on board USB-to-RS232 converter
  - On-chip debugger “EUROScope lite 16FX“
  - Software examples for the SK-16FX-64PMC

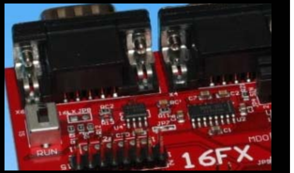
- **Additionally you can order the latest „Fujitsu MICROS DVD“**
  - Includes documentation & software for all Fujitsu microcontrollers
  - Please contact your local distributor

- **Please check our dedicated microcontroller website**

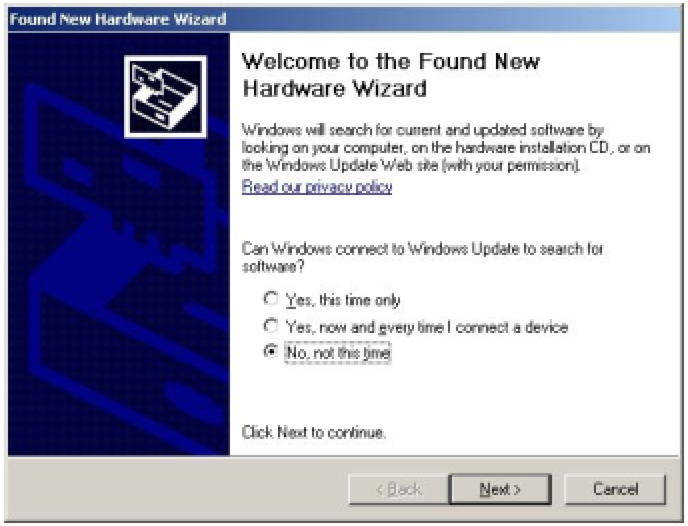
http://mcu.emea.fujitsu.com

  - for updates of the Flash programmer tool, utilities and examples
  - for data sheets, hardware manuals, application notes, etc.

Installation of the USB-driver



- **Connect the SK-16FX-64PMC to your PC’s USB port**
  - Windows will ‘Found New Hardware: SK-16FX-64PMC’ and the Hardware Wizard should start automatically
    - **Note: The installation procedure may differ with different operating systems**



Welcome to the Found New Hardware Wizard

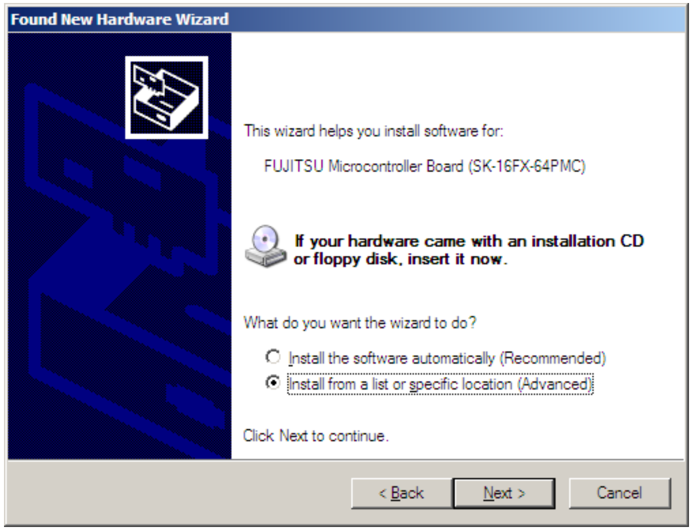
Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).

Read our privacy policy

Can Windows connect to Windows Update to search for software?

○ Yes, this time only
○ Yes, now and every time I connect a device
● No, not this time

Click Next to continue.



This wizard helps you install software for:

FUJITSU Microcontroller Board (SK-16FX-64PMC)

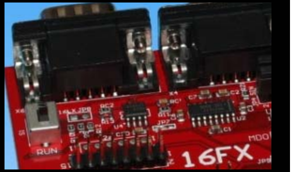
If your hardware came with an installation CD or floppy disk, insert it now.

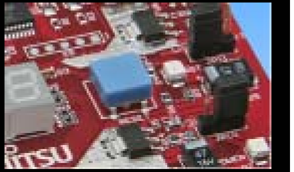
What do you want the wizard to do?

○ Install the software automatically (Recommended)
● Install from a list or specific location (Advanced)

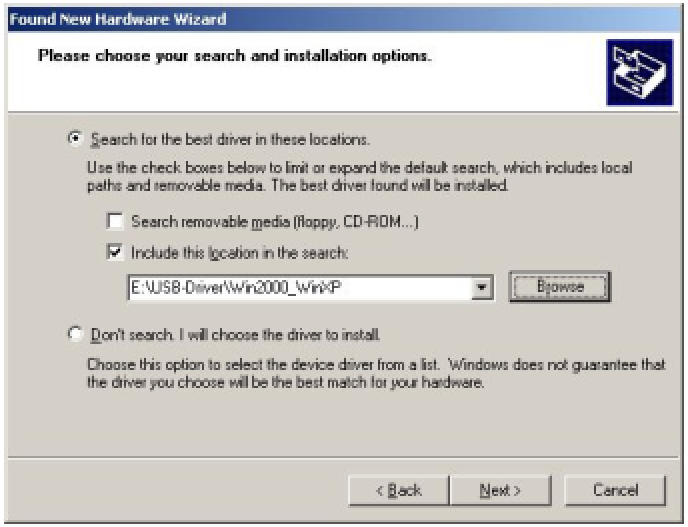
Click Next to continue.

  - Do not connect to Windows Update to search for software
  - Select ‘Install from a list or specific location (Advanced)’
  - Within next windows select ‘Search for the best driver’ and browse on the CD to the folder ‘drive:\USB-Driver\Win2000_WinXP’





Installation of the USB-driver



Found New Hardware Wizard

Please choose your search and installation options.

● Search for the best driver in these locations.

Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.

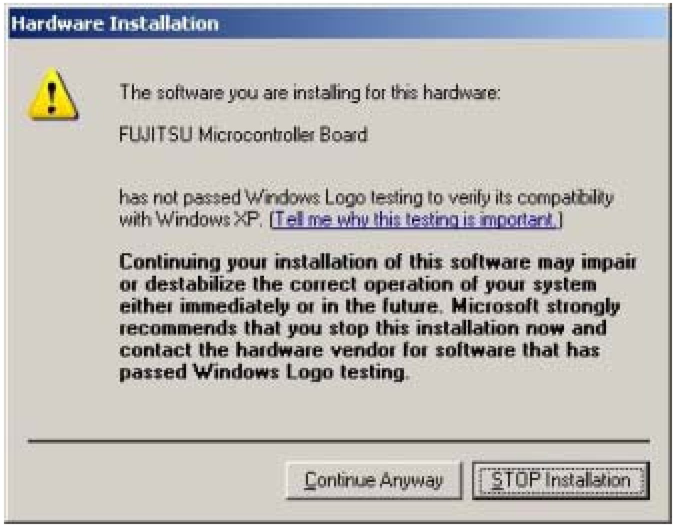
□ Search removable media (floppy, CD-ROM...)

☑ Include this location in the search:

E:\USB-Driver\Win2000_WinXP

○ Don't search. I will choose the driver to install.

Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.



Hardware Installation

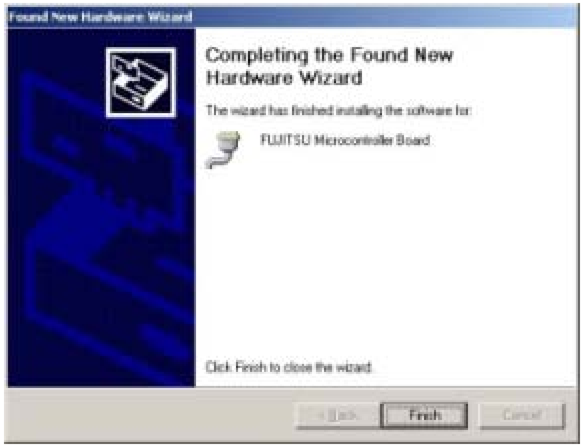
The software you are installing for this hardware:

FUJITSU Microcontroller Board

has not passed Windows Logo testing to verify its compatibility with Windows XP. (Tell me why this testing is important.)

Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the hardware vendor for software that has passed Windows Logo testing.

- ‘Continue anyway’ although the Windows Logo test may not be passed
- Windows completes the installation by copying some files
- ‘Finish’ will close the window



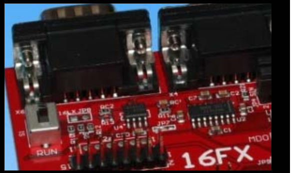
Found New Hardware Wizard

Completing the Found New Hardware Wizard

The wizard has finished installing the software for:

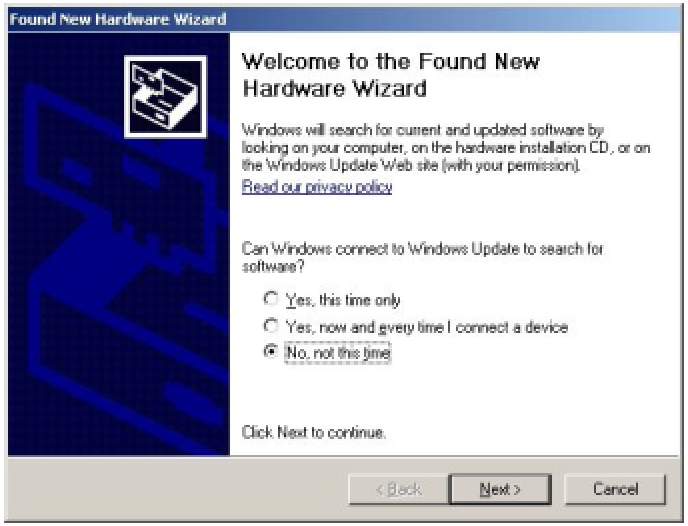
FUJITSU Microcontroller Board

Click Finish to close the wizard.



Installation of the USB-driver

- Again Windows will ‘Found New Hardware: USB Serial Port’ and the Hardware Wizard should start automatically
  - **Note: The installation procedure may differ with different operating systems**



Found New Hardware Wizard

Welcome to the Found New Hardware Wizard

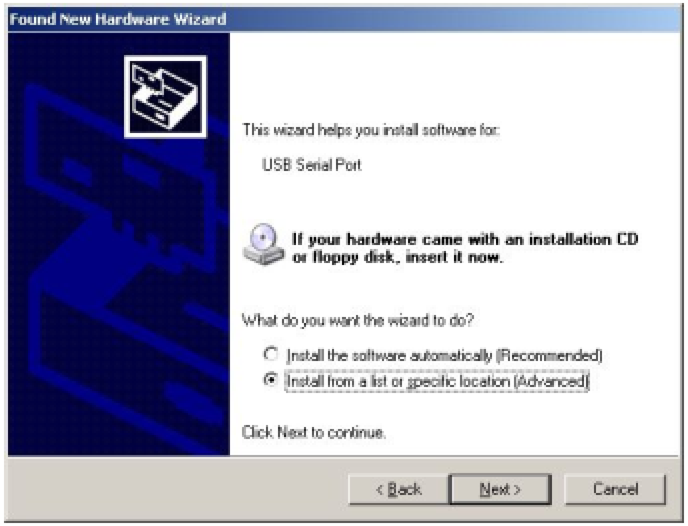
Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).

Read our privacy policy

Can Windows connect to Windows Update to search for software?

○ Yes, this time only
○ Yes, now and every time I connect a device
● No, not this time

Click Next to continue.



Found New Hardware Wizard

This wizard helps you install software for:

USB Serial Port

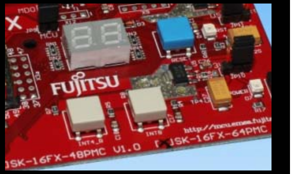
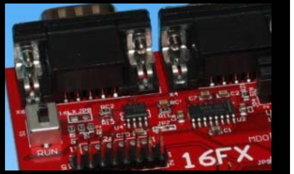
If your hardware came with an installation CD or floppy disk, insert it now.

What do you want the wizard to do?

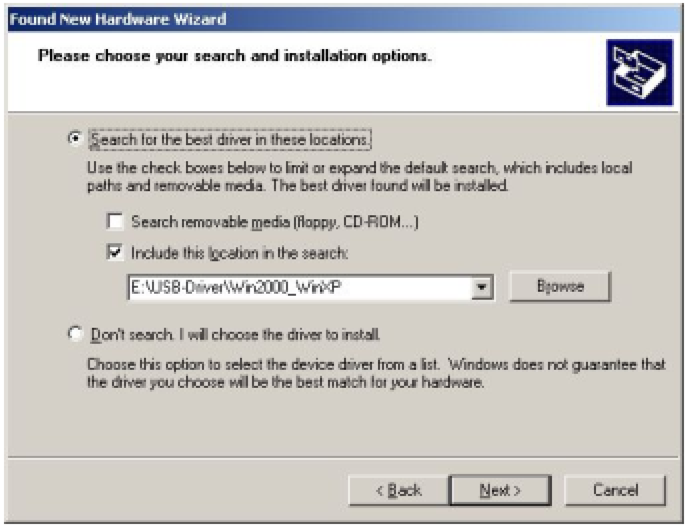
○ Install the software automatically (Recommended)
● Install from a list or specific location (Advanced)

Click Next to continue.

- Do not connect to Windows Update to search for software
- Select ‘Install from a list or specific location (Advanced)’
- Within next windows select ‘Search for the best driver’
  and browse on the CD to the folder ‘drive:\USB-Driver\Win2000_WinXP’

Installation of the USB-driver



Found New Hardware Wizard

Please choose your search and installation options.

● Search for the best driver in these locations.

Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.

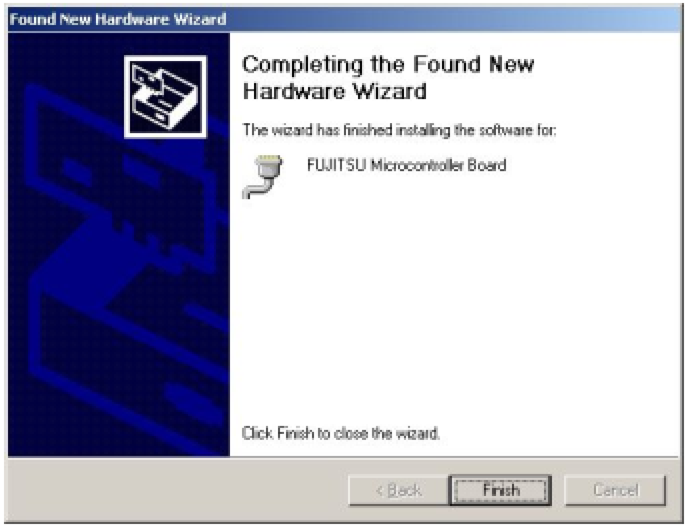
□ Search removable media (floppy, CD-ROM...)

☑ Include this location in the search:

E:\USB-Driver\Win2000_WinXP

○ Don't search. I will choose the driver to install.

Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.



Found New Hardware Wizard

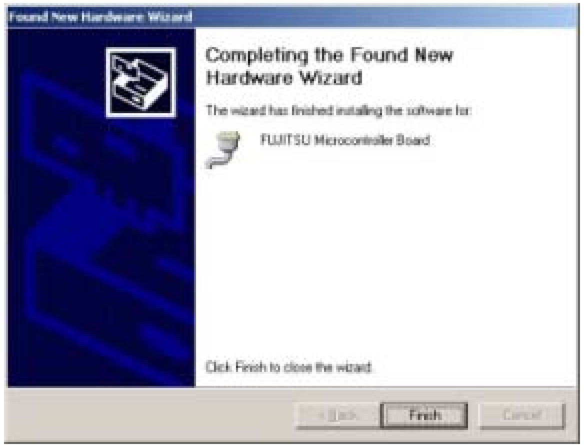
Completing the Found New Hardware Wizard

The wizard has finished installing the software for:

FUJITSU Microcontroller Board

Click Finish to close the wizard.

- 'Continue anyway' although the Windows Logo test may not be passed
- Windows completes the installation by copying some files



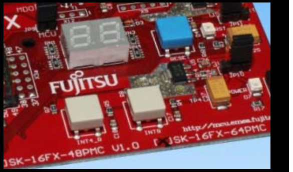
Found New Hardware Wizard

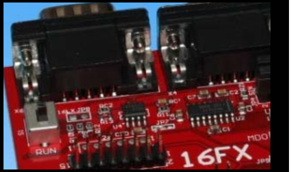
Completing the Found New Hardware Wizard

The wizard has finished installing the software for:

FUJITSU Microcontroller Board

Click Finish to close the wizard.

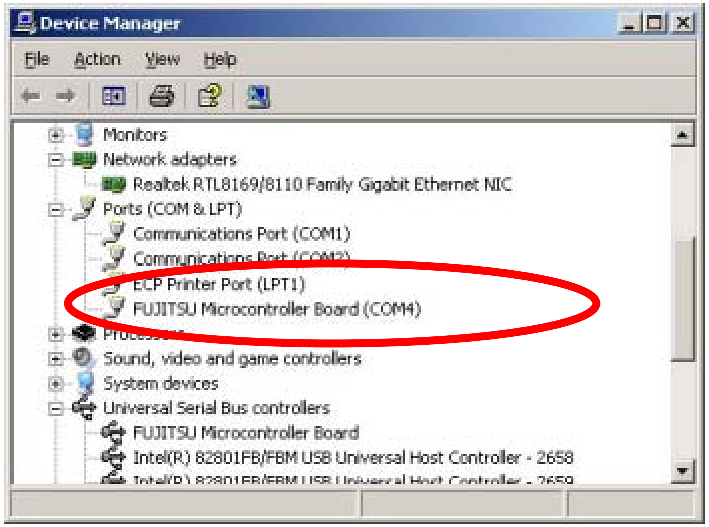




Installation of the USB-driver

- **Start the Device Manager of the Windows Control Panel**
  - START -> Settings -> Control Panel
  - Control Panel -> System -> Hardware -> Device Manager

- **Check 'Ports' for the assigned virtual COM-port number**
  - FUJITSU Microcontroller board (e.g.: COM4)

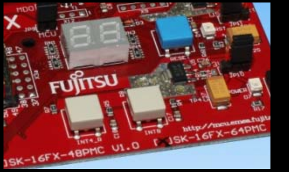


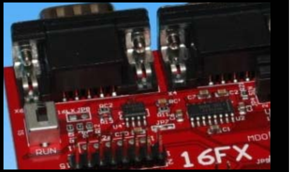
Monitors
Network adapters
Realtek RTL8169/8110 Family Gigabit Ethernet NIC
Ports (COM & LPT)
Communications Port (COM1)
Communications Port (COM2)
ECP Printer Port (LPT1)
FUJITSU Microcontroller Board (COM4)
Processors
Sound, video and game controllers
System devices
Universal Serial Bus controllers
FUJITSU Microcontroller Board
Intel(R) 82801FB/FBM USB Universal Host Controller - 2658
Intel(R) 82801FB/FBM USB Universal Host Controller - 2659

<u>Note:</u>
Currently EUROScope supports only COM1 - COM9.

If the assigned virtual COM-port is greater than COM9 then please re-assign it manually by help of the device manager within the Windows control panel / system.

- **Ready!**
  - The SK-16FX-64PMC can be powered via USB (default, JP11)
  - Depending on JP4 and JP5 one UART is connected to USB

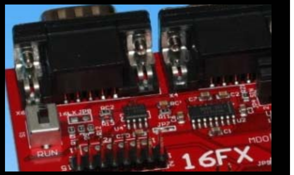




The Development Software

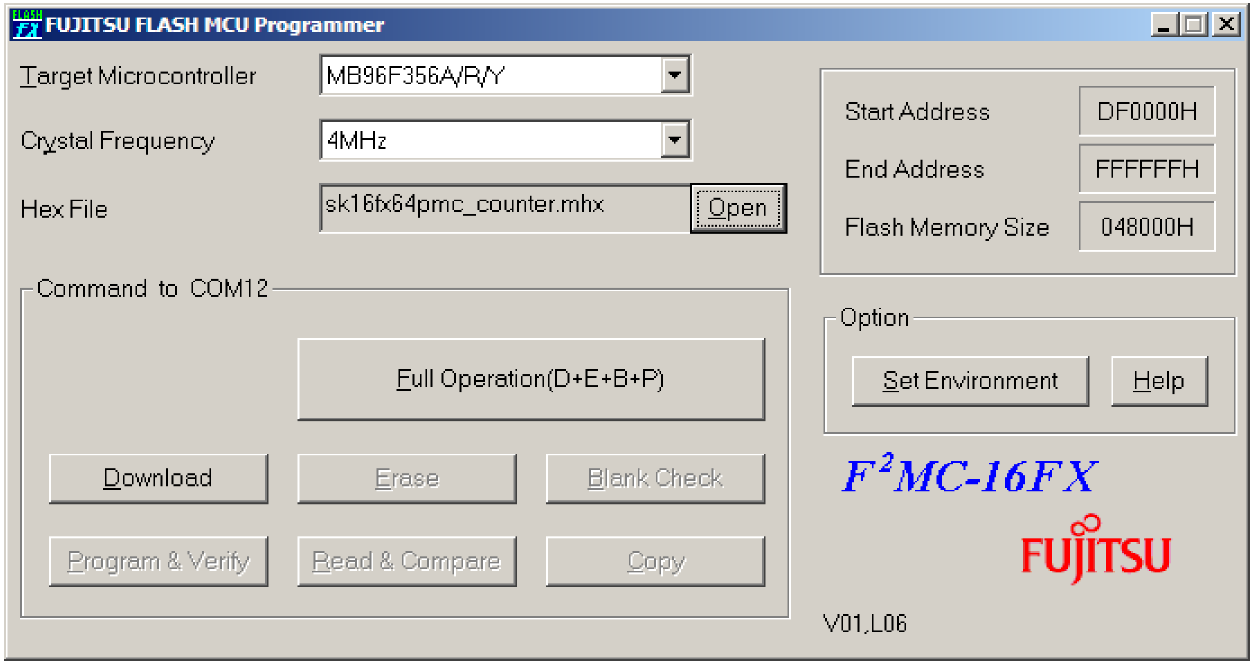
- **Softune Workbench**
  - Free of charge (only registration is required)
  - Windows based development platform for all 16-bit microcontrollers
  - Includes: Editor, C-compiler, assembler, linker, core simulator
  - Supports optional hardware emulator
  - Requires ‘administration’ or ‘power user’ rights on the PC
  - Registration[*1]
    - https://mcu.emea.fujitsu.com/cusreg/htm/cusreg_form.htm
    - Receive your password for Softune Workbench by email
    - Receive your license file for EUROScope by email
  - Start installation
    - Enter password and choose destination folder (e.g. c:\Softune16)

[*1] Note: If you want to use EUROScope please install and run it first and note down the Host ID (MAC address) of your PC system. This ID is needed to be filled out in the registration form to obtain a license key.



The FLASH Programmer

- **MCU Flash programmer**
  - Free of charge, no registration required
  - Windows based programming tool for all 16-bit Fujitsu microcontroller
  - Uses PC serial port COMx (incl. virtual COM port: USB-to-RS232)
  - Start installation



FUJITSU FLASH MCU Programmer

Target Microcontroller: MB96F356A/R/Y

Crystal Frequency: 4MHz

Hex File: sk16fx64pmc_counter.mhx

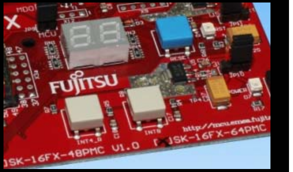
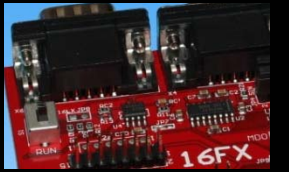
Start Address: DF0000H

End Address: FFFFFFH

Flash Memory Size: 048000H

Command to COM12

V01.L06

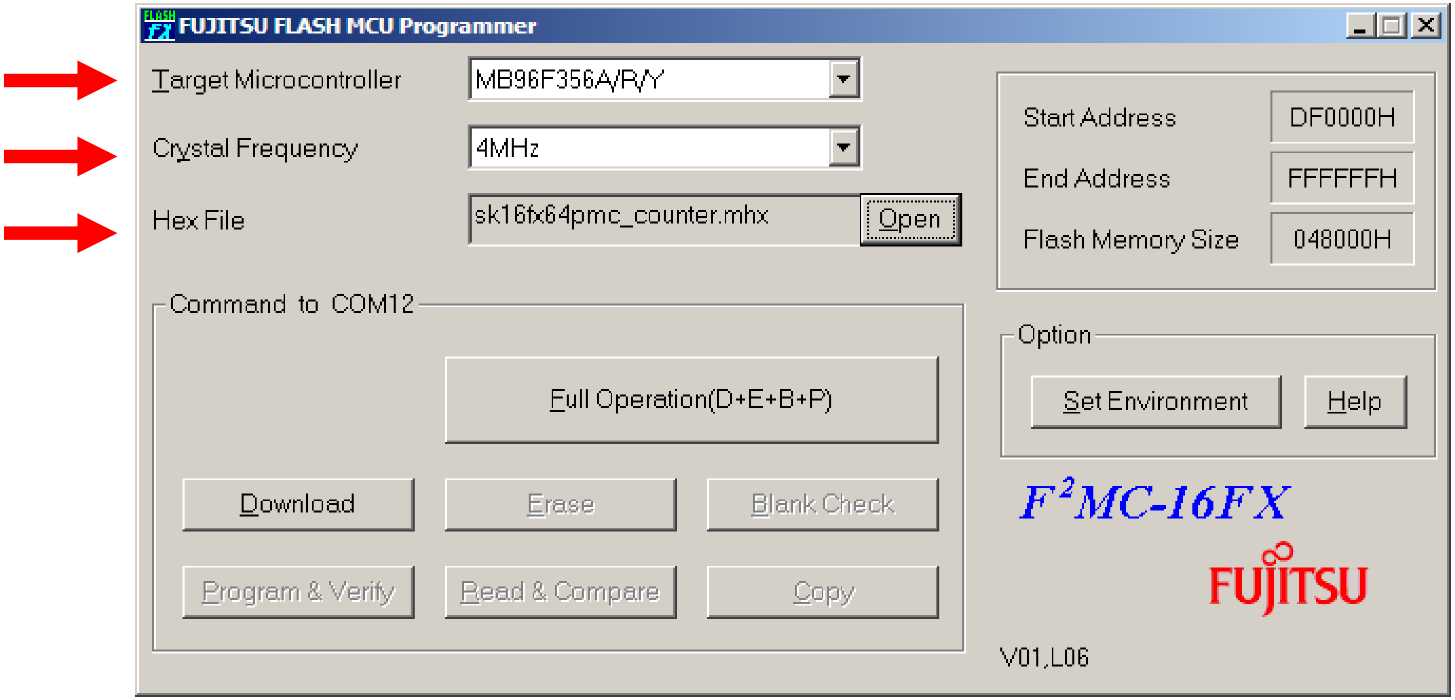
Tools and Software Examples

- **SKwizard**
  - Free of charge terminal program
  - Start installation
- **Following examples are provided with SK-16FX-64PMC:**
  - sk16fx64pmc_adc_dvm
    - Digital Voltage Meter based on the A/D-converter
  - sk16fx64pmc_can_uart_terminal
    - Simple CAN example controlled by UART7_R
  - sk16fx64pmc_counter
    - Counts from 0 to 99 on the 7-segment Display
  - sk16fx64pmc_template
    - ‚Empty‘ project as base for user applications
  - sk16fx64pmc_uart
    - UART example using UART7_R
  - sk16fx64pmc_uart_7seg
    - Displays UART Characters on the 7-segment Display

Note:
Do not connect other than EUROScope to UART2 (default: X5/USB).
All examples are prepared to be used with EUROScope and UART2 is reserved for this debugger.

Program Download

- Start the Fujitsu MCU Flash programmer
- Select the target microcontroller (MB96F356A/R/Y)
- Select the crystal frequency (4 MHz)
- Choose the software example from the example ‘ABS‘-folder
  (e.g. D:\Examples\sk16fx64pmc_counter-v10\ABS\sk16fx64pmc_counter.mhx)



FUJITSU FLASH MCU Programmer

Target Microcontroller: MB96F356A/R/Y

Crystal Frequency: 4MHz

Hex File: sk16fx64pmc_counter.mhx

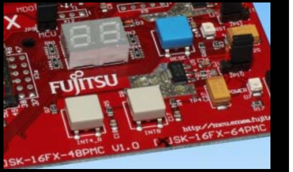
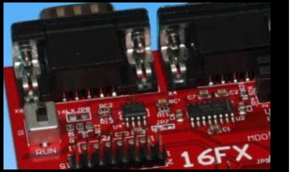
Start Address: DF0000H

End Address: FFFFFFH

Flash Memory Size: 048000H

Command to COM12

V01,L06

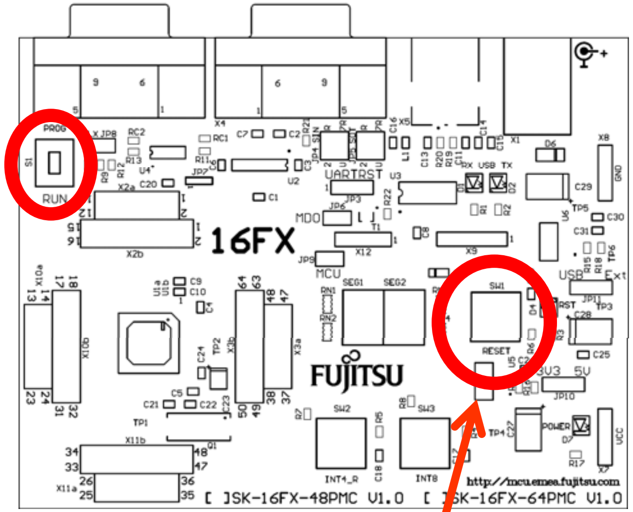



Program Download

- **Connect to the PC**
  - RS232 or USB can be used
  - Select COM port (‚Set Environment‘)
- **Set jumper S1 to position ‚Prog‘**
- **Press ‚Reset‘**
- **Start ‚Full operation‘**

RS232 USB port

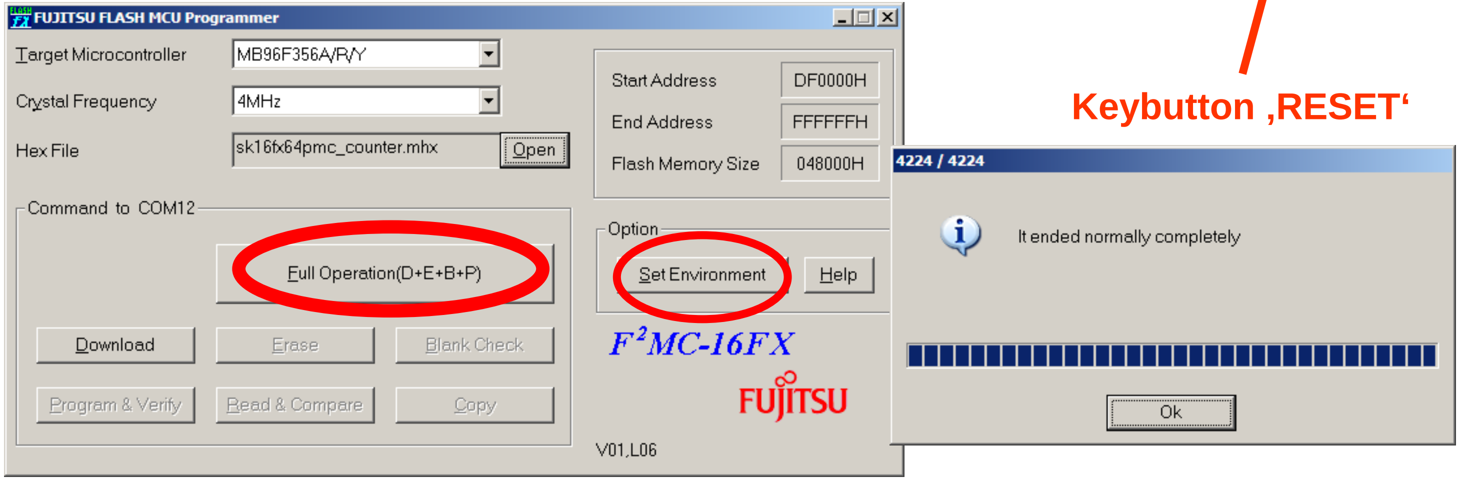
(see chapter Jumper seetings)



S1: Mode selection

Prog: **Set switch to position ‚Prog‘ in order to select the program-mode**

Keybutton ‚RESET‘



FUJITSU FLASH MCU Programmer

Target Microcontroller: MB96F356A/R/Y

Crystal Frequency: 4MHz

Hex File: sk16fx64pmc_counter.mhx

Start Address: DF0000H

End Address: FFFFFFH

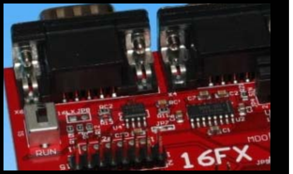
Flash Memory Size: 048000H

Command to COM12

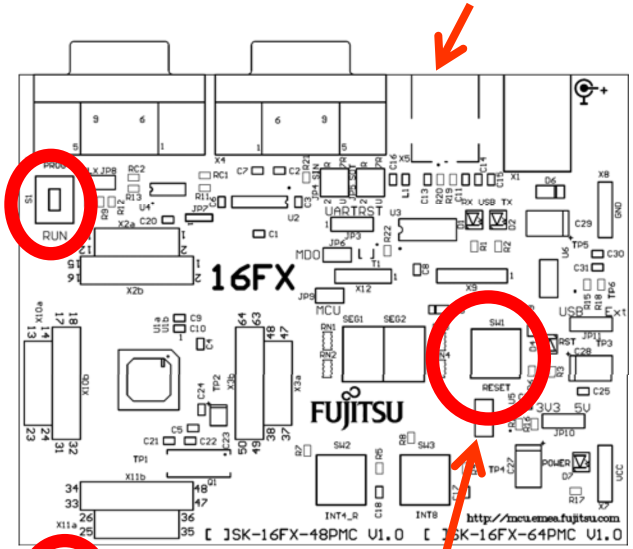
4224 / 4224

It ended normally completely

Program Download



- **Close the MCU Flash programmer**
- **Set jumper S1 to position ‚RUN‘**
- **Press ‚Reset‘**



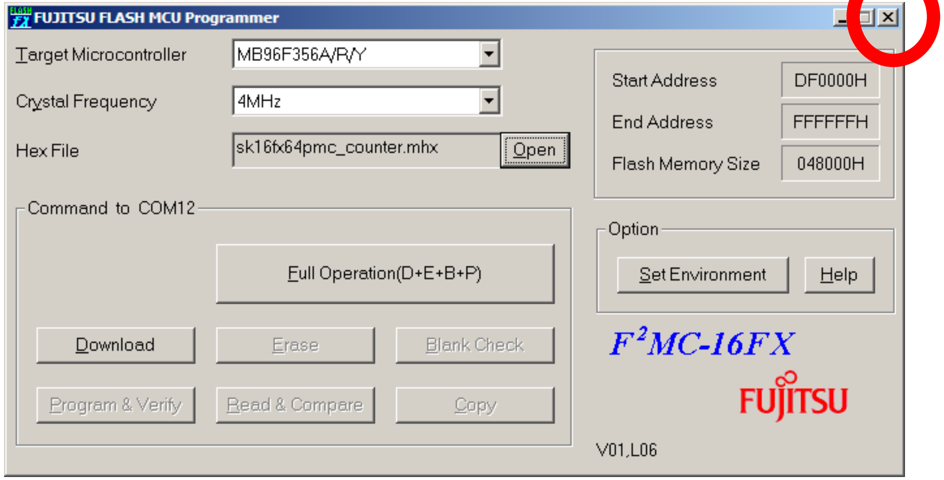
USB port

S1: Mode selection

Prog: Set switch to position ‚RUN‘ in order to select the RUN-mode

Keybutton ‚RESET‘

Close the Flash programmer



FUJITSU FLASH MCU Programmer

Target Microcontroller: MB96F356A/R/Y

Crystal Frequency: 4MHz

Hex File: sk16fx64pmc_counter.mhx

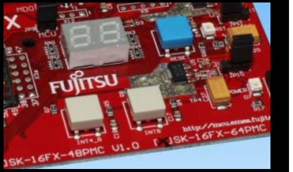
Start Address: DF0000H

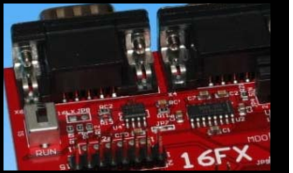
End Address: FFFFFFH

Flash Memory Size: 048000H

Command to COM12

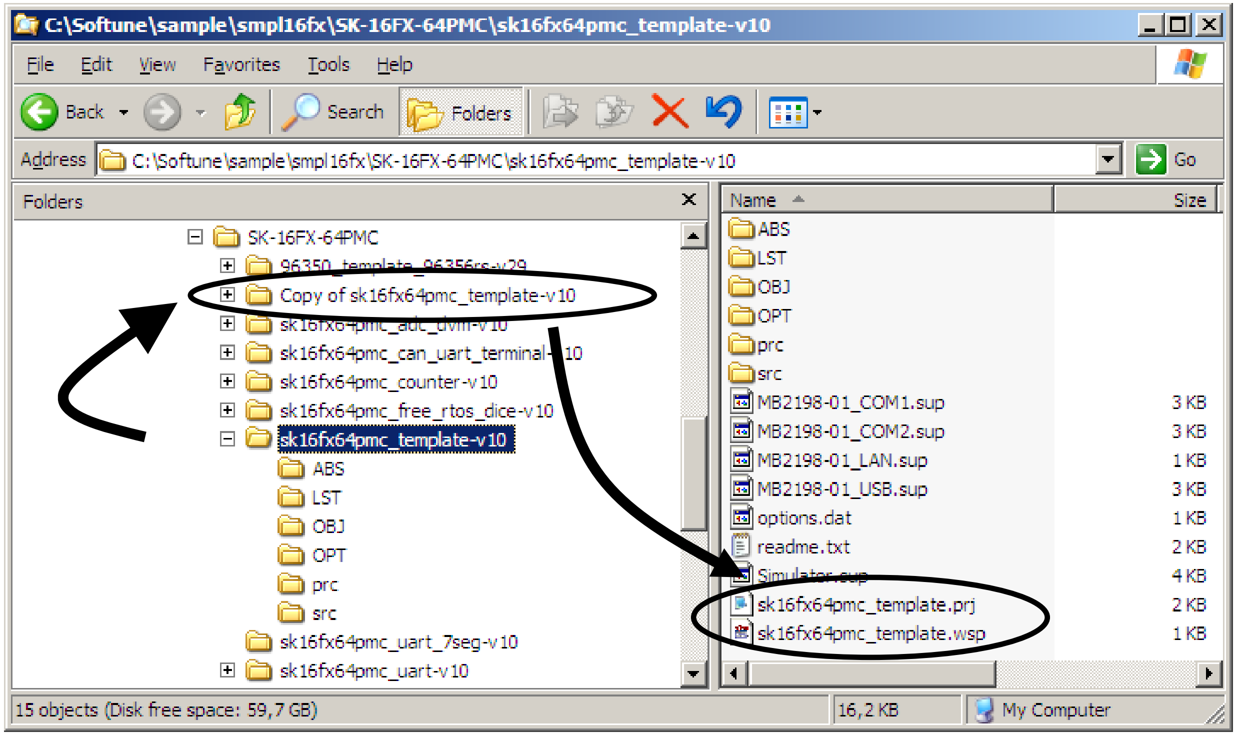
V01,L06





New Project

- **In order to start a new user project use the template project**
  - This project includes the startup code, header files, and vector table
- **Copy the folder 'Template' within the example folder**
  - Rename 'Copy of sk16fx64pmc_template-v10' to 'my_application'



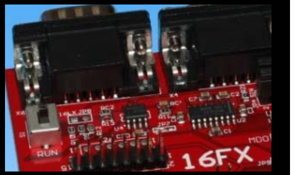
C:\Softune\sample\smpl16fx\SK-16FX-64PMC\sk16fx64pmc_template-v10

Address C:\Softune\sample\smpl16fx\SK-16FX-64PMC\sk16fx64pmc_template-v10

```
Folders
⊟ SK-16FX-64PMC
   ⊞ 96350_template_96356rs-v29
   ⊞ Copy of sk16fx64pmc_template-v10
   ⊞ sk16fx64pmc_adc_dvm-v10
   ⊞ sk16fx64pmc_can_uart_terminal-v10
   ⊞ sk16fx64pmc_counter-v10
   ⊞ sk16fx64pmc_free_rtos_dice-v10
   ⊟ sk16fx64pmc_template-v10
        ABS
        LST
        OBJ
        OPT
        prc
        src
     sk16fx64pmc_uart_7seg-v10
   ⊞ sk16fx64pmc_uart-v10
```

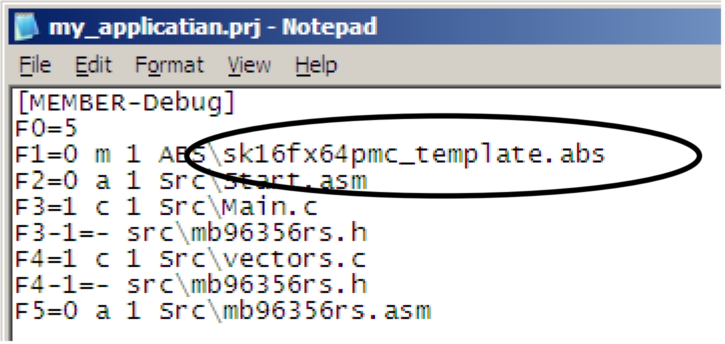
Name	Size
ABS	
LST	
OBJ	
OPT	
prc	
src	
MB2198-01_COM1.sup	3 KB
MB2198-01_COM2.sup	3 KB
MB2198-01_LAN.sup	1 KB
MB2198-01_USB.sup	3 KB
options.dat	1 KB
readme.txt	2 KB
Simulator.sup	4 KB
sk16fx64pmc_template.prj	2 KB
sk16fx64pmc_template.wsp	1 KB

15 objects (Disk free space: 59,7 GB) | 16,2 KB | My Computer

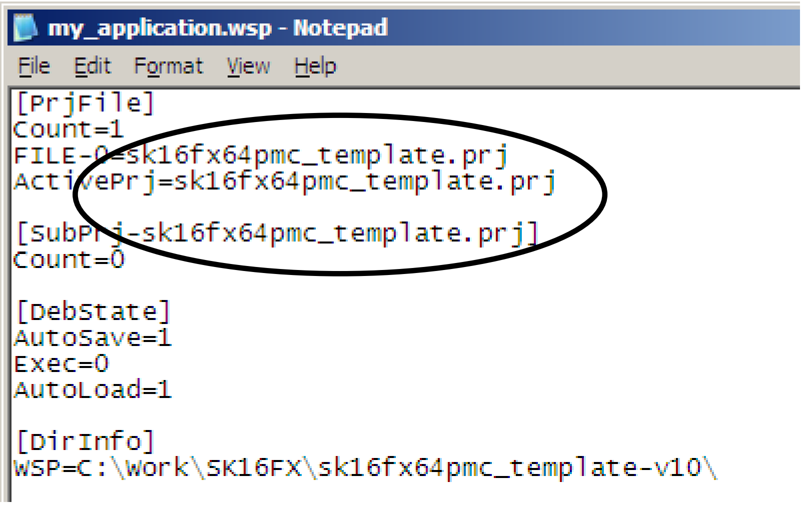


New Project

- **Enter ‘my_application’-folder**
  - Rename ‘template.prj‘ into ‘my_application.prj‘
  - Rename ‘template.wsp‘ into ‘my_application.wsp’
- **Edit ’my_application.prj’**
  - rename ‘sk16fx64pmc_template’ -> ‘my_application’
- **Edit ‘my_application.wsp’**
  - rename ‘sk16fx64pmc_ template’ -> ‘my_application’



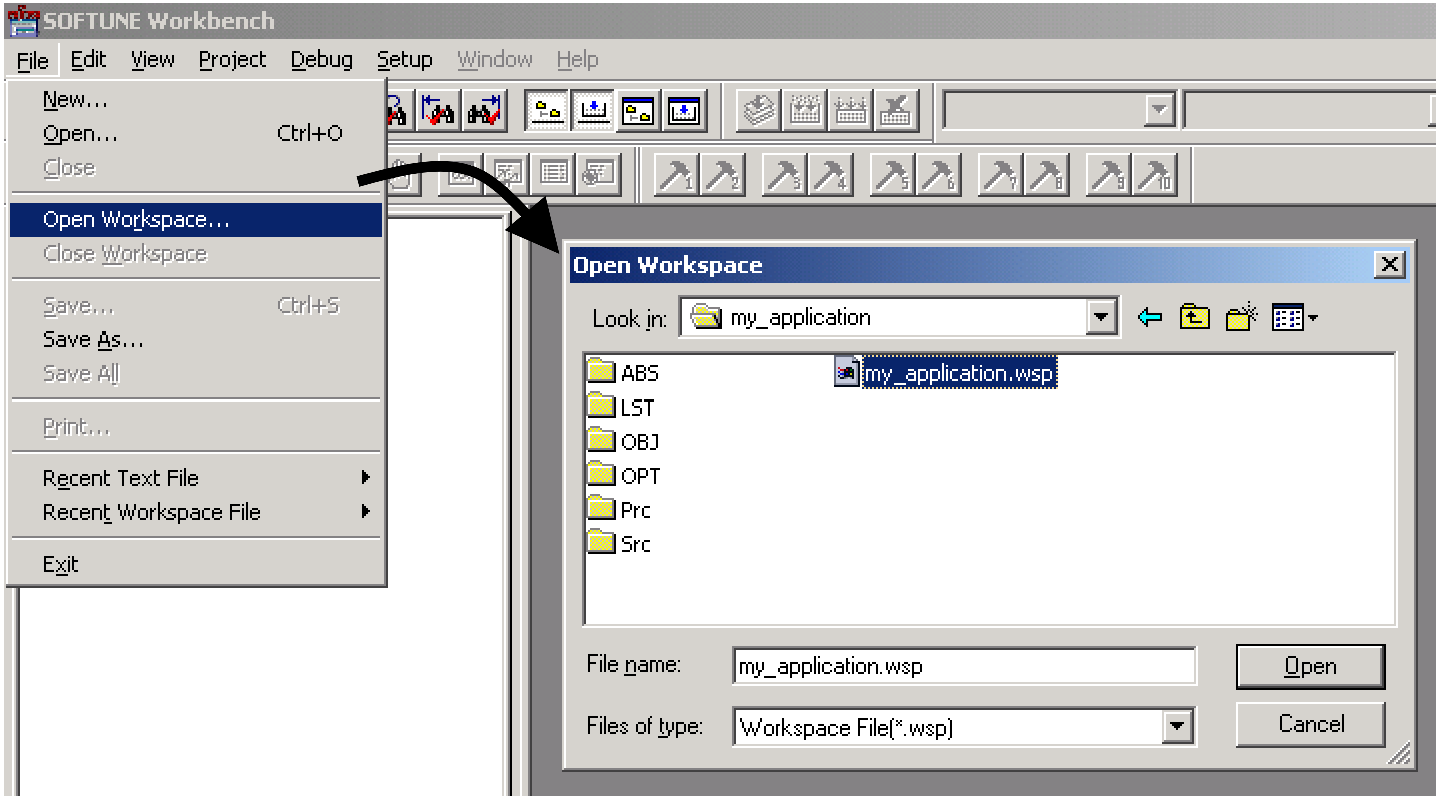
```
[MEMBER-Debug]
F0=5
F1=0 m 1 ABS\sk16fx64pmc_template.abs
F2=0 a 1 Src\Start.asm
F3=1 c 1 Src\Main.c
F3-1=- src\mb96356rs.h
F4=1 c 1 Src\vectors.c
F4-1=- src\mb96356rs.h
F5=0 a 1 Src\mb96356rs.asm
```



```
[PrjFile]
Count=1
FILE-0=sk16fx64pmc_template.prj
ActivePrj=sk16fx64pmc_template.prj

[SubPrj-sk16fx64pmc_template.prj]
Count=0

[DebState]
AutoSave=1
Exec=0
AutoLoad=1

[DirInfo]
WSP=C:\Work\SK16FX\sk16fx64pmc_template-v10\
```

New Project

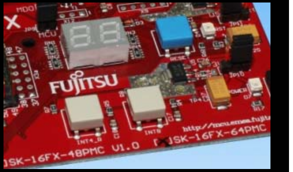
- **Start Softune Workbench and open your project**

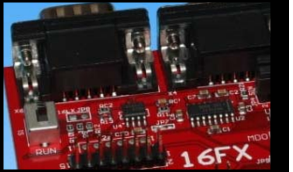


Look in: my_application

File name: my_application.wsp

Files of type: Workspace File(*.wsp)

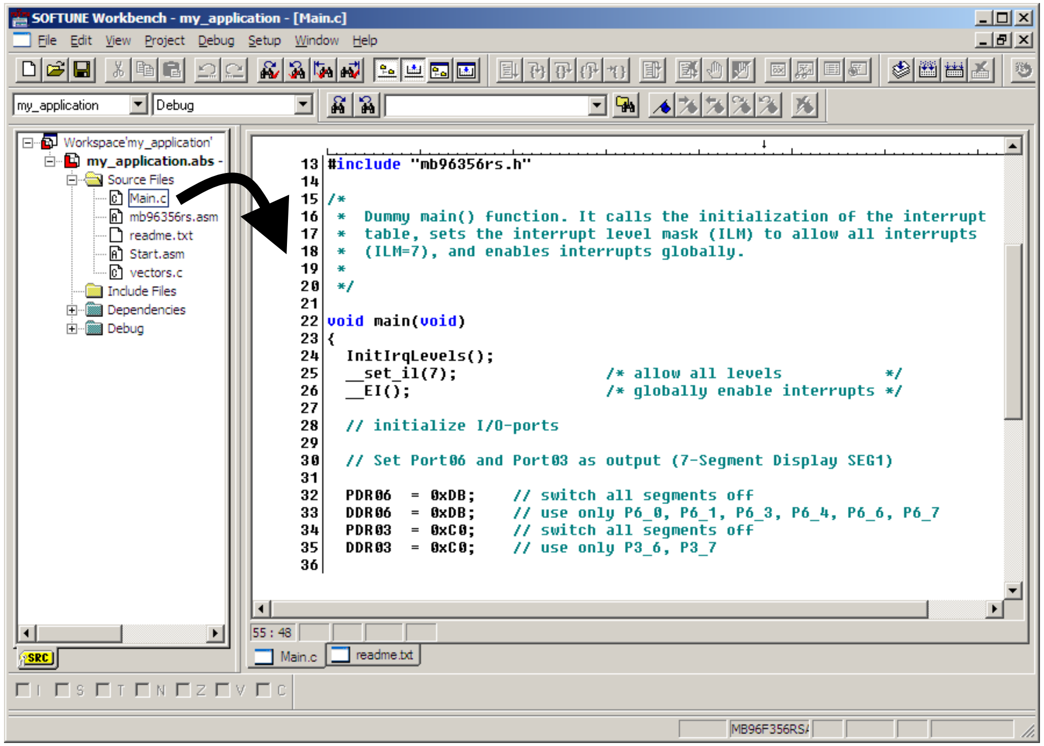




New Project

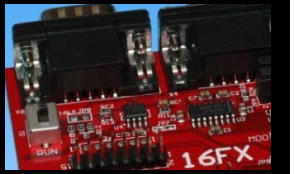
Write your application code

- `Start.asm` : Startup code
- `Vectors.c` : Vector table
- `Main.c` : Your application

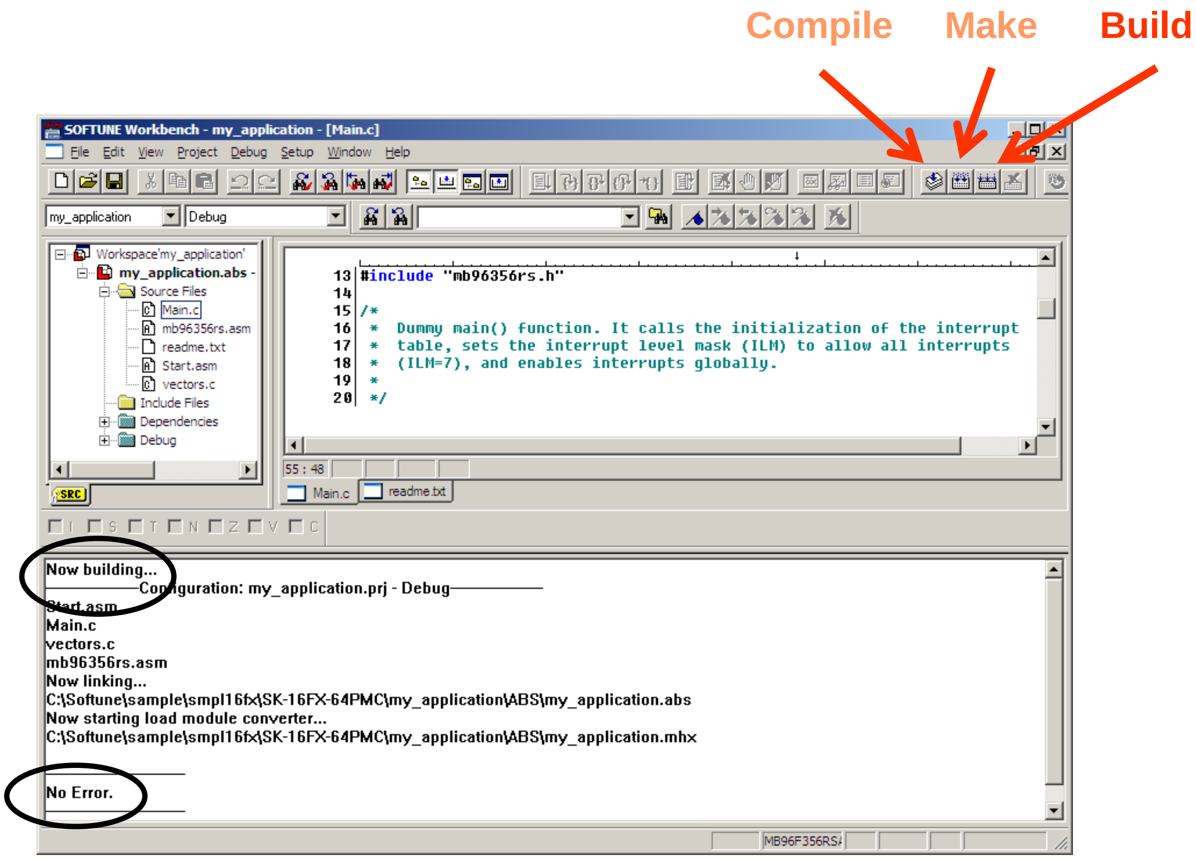


```c
#include "mb96356rs.h"

/*
 *  Dummy main() function. It calls the initialization of the interrupt
 *  table, sets the interrupt level mask (ILM) to allow all interrupts
 *  (ILM=7), and enables interrupts globally.
 *
 */

void main(void)
{
  InitIrqLevels();
  __set_il(7);                    /* allow all levels          */
  __EI();                         /* globally enable interrupts */

  // initialize I/O-ports

  // Set Port06 and Port03 as output (7-Segment Display SEG1)

  PDR06  = 0xDB;    // switch all segments off
  DDR06  = 0xDB;    // use only P6_0, P6_1, P6_3, P6_4, P6_6, P6_7
  PDR03  = 0xC0;    // switch all segments off
  DDR03  = 0xC0;    // use only P3_6, P3_7

```

New Project



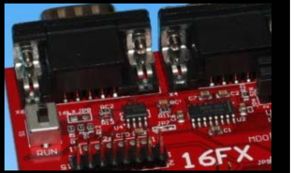
- **Compile and build your project**
  - Generates the MHX-file, which can be programmed to the Flash



Compile Make Build

```
#include "mb96356rs.h"

/*
 *  Dummy main() function. It calls the initialization of the interrupt
 *  table, sets the interrupt level mask (ILM) to allow all interrupts
 *  (ILM=7), and enables interrupts globally.
 *
 */
```

```
Now building...
---------------Configuration: my_application.prj - Debug---------------
Start.asm
Main.c
vectors.c
mb96356rs.asm
Now linking...
C:\Softune\sample\smpl16fx\SK-16FX-64PMC\my_application\ABS\my_application.abs
Now starting load module converter...
C:\Softune\sample\smpl16fx\SK-16FX-64PMC\my_application\ABS\my_application.mhx

No Error.
```

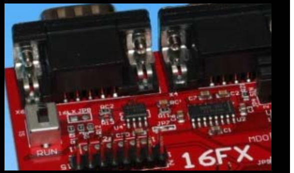


New Project

Congratulations!

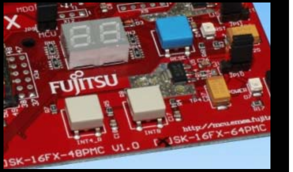
- **You have finished your first project**
  - Please see our application note
    ‘16FX Getting Started’
    for a more detailed introduction.

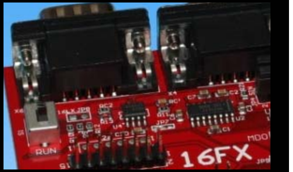
EUROScope lite 16FX



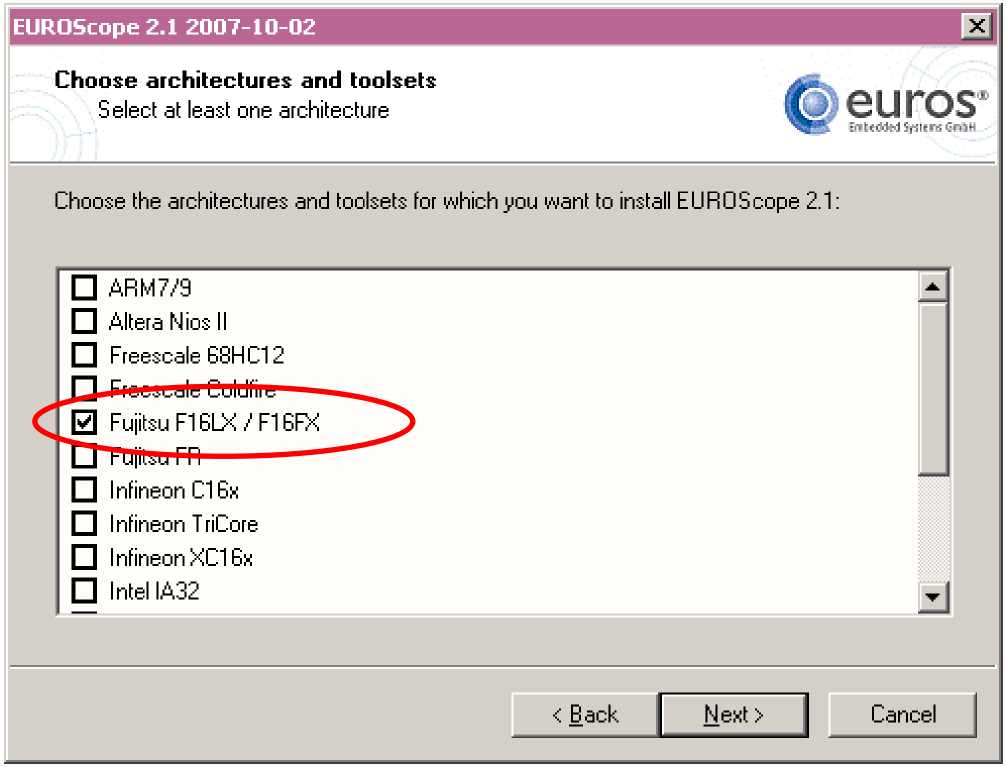
- **„EUROScope lite 16FX“ source-level debugger**
  - On-chip debugging for 16FX microcontroller
  - No kernel linkage / upload required
  - Breakpoints
  - Single step debugging (step, step-in, step-out)
  - Windows for memory, watch, mixed source code, register
  - Plug-ins available for operating systems etc.

EUROScope lite 16FX Installation





- **Installation of „EUROScope lite 16FX“**
  - Start „EUROScope lite 16FX“ for installation
  - Choose „Fujitsu F16LX / F16FX“ from list



EUROScope 2.1 2007-10-02

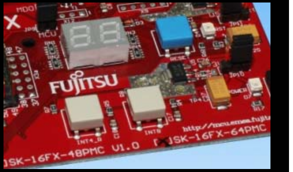
Choose architectures and toolsets

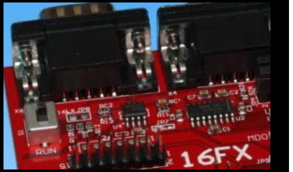
Select at least one architecture

Choose the architectures and toolsets for which you want to install EUROScope 2.1:

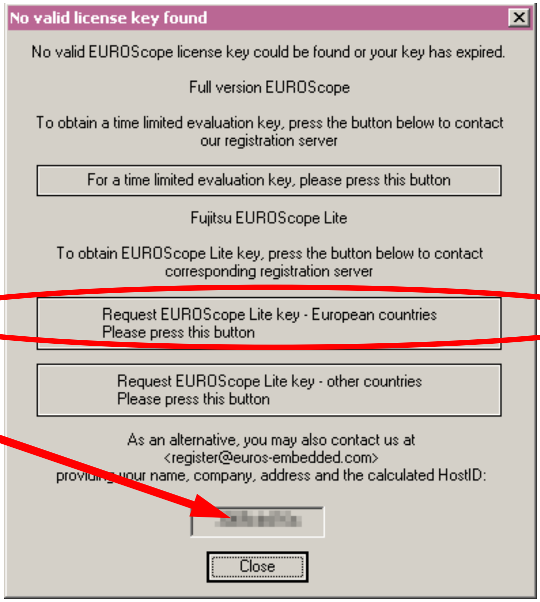
□ ARM7/9
□ Altera Nios II
□ Freescale 68HC12
□ Freescale Coldfire
☑ Fujitsu F16LX / F16FX
□ Fujitsu FR
□ Infineon C16x
□ Infineon TriCore
□ Infineon XC16x
□ Intel IA32

EUROScope lite 16FX Installation





- **License for „EUROScope lite 16FX“**
  - Run EUROScope.exe
    - Copy Host ID (MAC address) of your PC system
    - Request Lite key at https://mcu.emea.fujitsu.com/cusreg/htm/cusreg_form.htm
    - Receive license key file from company EUROS by email
    - Copy license key file (*euros-license.key*) to your local installation path



No valid license key found

No valid EUROScope license key could be found or your key has expired.

Full version EUROScope

To obtain a time limited evaluation key, press the button below to contact our registration server

For a time limited evaluation key, please press this button

Fujitsu EUROScope Lite

To obtain EUROScope Lite key, press the button below to contact corresponding registration server

Request EUROScope Lite key - European countries
Please press this button

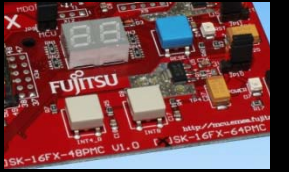
Request EUROScope Lite key - other countries
Please press this button

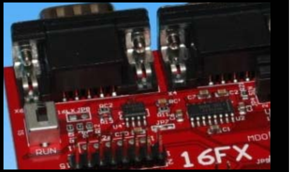
As an alternative, you may also contact us at <register@euros-embedded.com> providing your name, company, address and the calculated HostID:

[redacted]

Host ID of your PC system

EUROScope lite 16FX
Project preparation



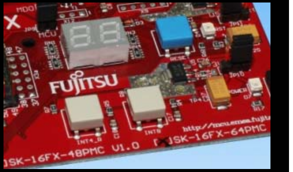
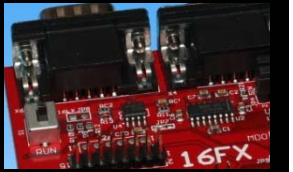


- **All examples within this package are already prepared for the use with EUROScope**
  - Default connection: UART2 routed to X5/USB.

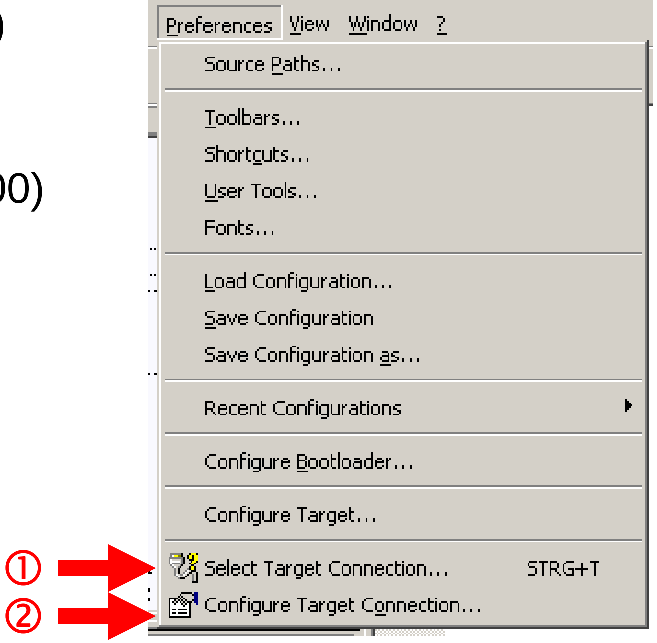
- **In case of new projects or project modifications**
  - Use Softune Workbench
  - Setup the Background Debugging area
    - See *Start.asm* (V1.28), chapter 4.18 (Enable Background Debugging Mode) and chapter 5.9 (Debug Address Specification)
      - See always the latest 'sk16fx64pmc_template' example
  - Built your application project with Softune Workbench
    - Loadmodule (*.*abs*) format is required for debugging

- **Download your project (*.*mhx*) to the board**
  - Use the Fujitsu MCU Flash programmer

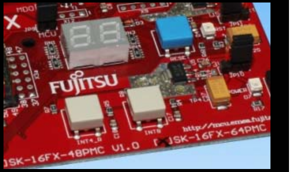
EUROScope lite 16FX Configuration

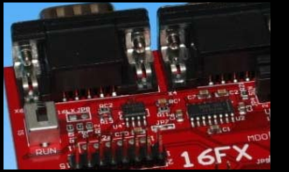



- **Start EUROScope**
- **Ensure the following settings**
  - Select Target Connection ①
    - Choose Fujitsu 16FXBootROM (RS232)
  - Configure Target Connection ②
    - Choose the COM port of the Debug-UART (Default: UART2 routed to X5/USB)
    - Choose the baudrate used in the Debug Address Specification of the *Start.asm* file (Default: 115200)
    - Choose „asynchronous communication“ and „Int/Ext vector mode“

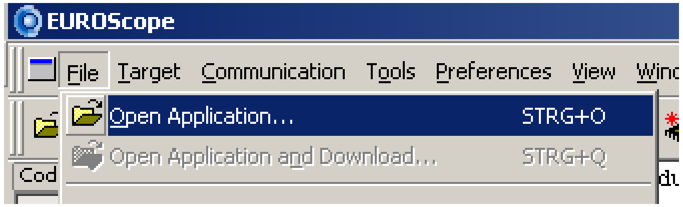


EUROScope lite 16FX
Load ABS file



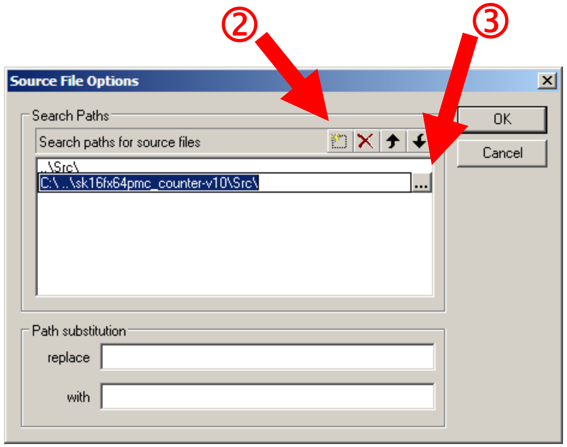


- **Load the *abs* file of your project**
  - File / Open Application ...

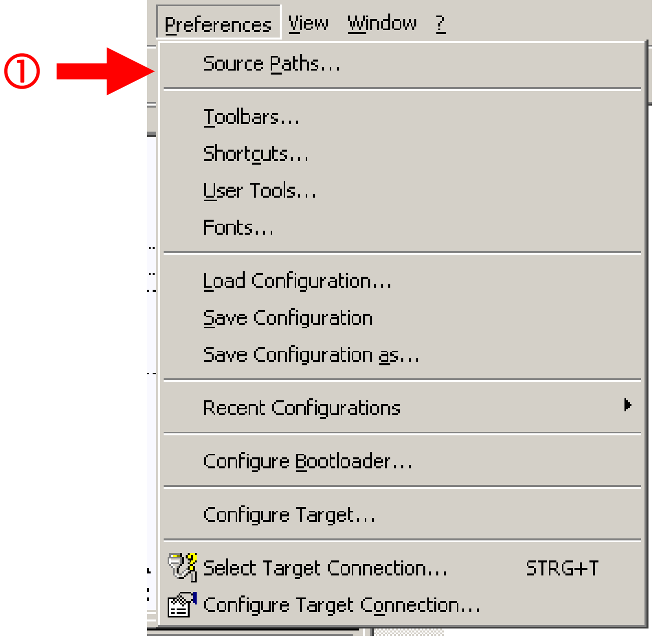

EUROScope
File Target Communication Tools Preferences View Wind
Open Application... STRG+O
Open Application and Download... STRG+Q
Cod

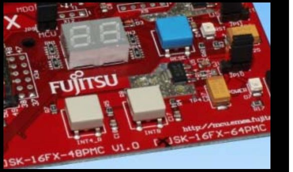
E.g.: <drive>:\Examples\sk16fx64pmc_counter-v10\ABS\sk16fx64pmc_counter.abs

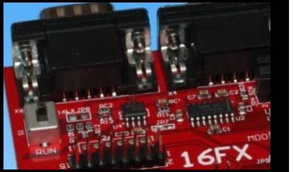
- **Projects may be compiled on another PC or folder structure than the debug PC**
  - Adjust the source path ①
    - Click New (Insert) ②
    - Browse to source folder ③
    - E.g.: <drive>:\Examples\sk16fx64pmc_counter-v10\Src



..\Src\
C:\..\sk16fx64pmc_counter-v10\Src\

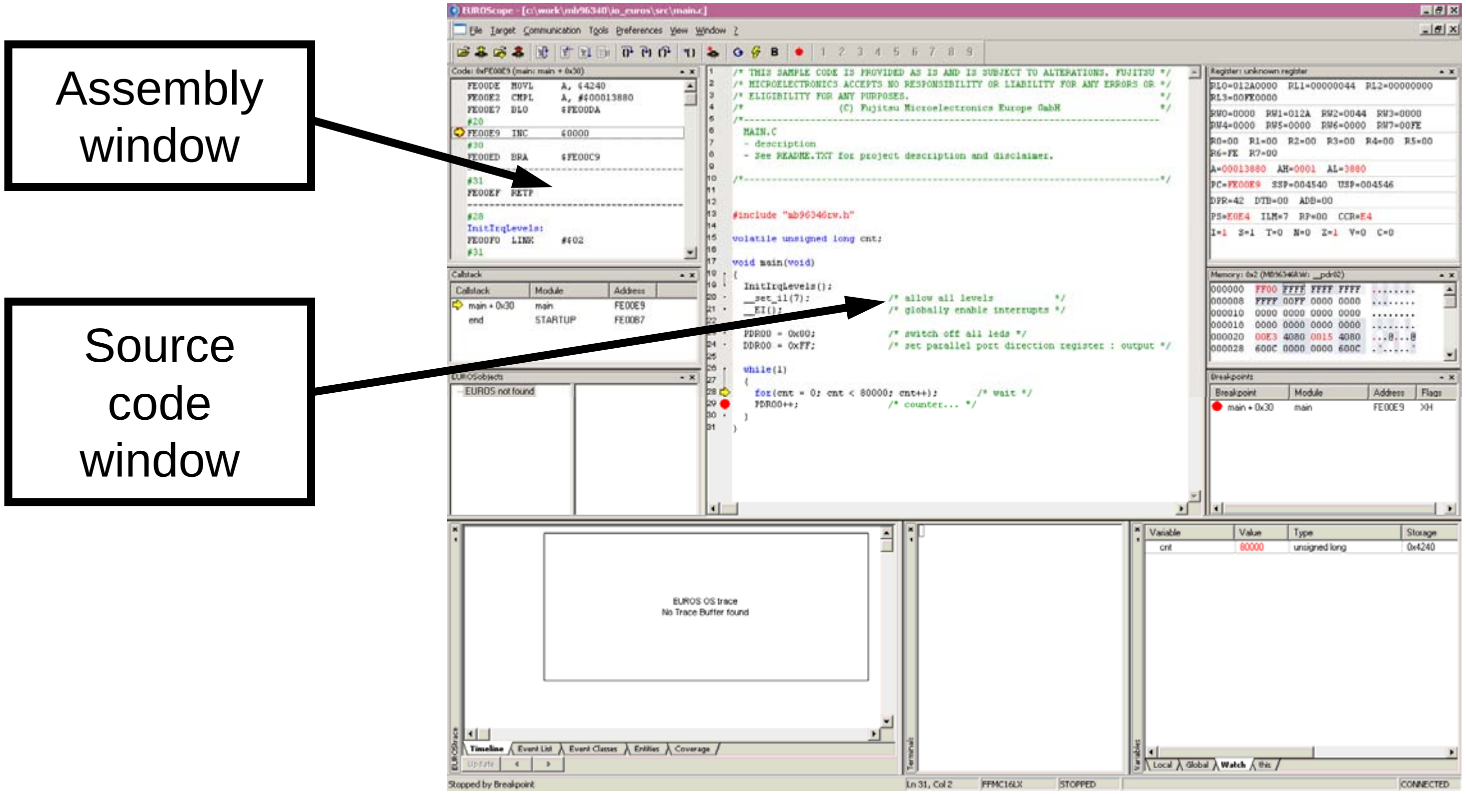






EUROScope lite 16FX Connect to device

- **Start communication (*Communication* -> *Open*)**
- **Press reset button**
- **Communication is established, if code in the assembly and source code window is visible**



Assembly window

Source code window

EUROScope - [c:\work\mb96340\io_euros\src\main.c]

Code: 0xFE00E9 (main: main + 0x30)

```
FE00DE  MOVL    A, $4240
FE00E2  CMPL    A, #$00013880
FE00E7  BLO     $FE00DA
#20
FE00E9  INC     $0000
#30
FE00ED  BRA     $FE00C9
---------------------------------------
#31
FE00EF  RETP
---------------------------------------
#28
InitIrqLevels:
FE00F0  LINK    #$02
#31
```

Callstack

Callstack	Module	Address
main + 0x30	main	FE00E9
end	STARTUP	FE00B7

EUROSobjects

EUROS not found

```c
/* THIS SAMPLE CODE IS PROVIDED AS IS AND IS SUBJECT TO ALTERATIONS. FUJITSU */
/* MICROELECTRONICS ACCEPTS NO RESPONSIBILITY OR LIABILITY FOR ANY ERRORS OR */
/* ELIGIBILITY FOR ANY PURPOSES.                                             */
/*                 (C) Fujitsu Microelectronics Europe GmbH                  */
/*------------------------------------------------------------------------
  MAIN.C
  - description
  - See README.TXT for project description and disclaimer.

/*-------------------------------------------------------------------------*/


#include "mb96346rw.h"

volatile unsigned long cnt;

void main(void)
{
  InitIrqLevels();
  __set_il(7);                  /* allow all levels          */
  __EI();                       /* globally enable interrupts */

  PDR00 = 0x00;                 /* switch off all leds */
  DDR00 = 0xFF;                 /* set parallel port direction register : output */

  while(1)
  {
    for(cnt = 0; cnt < 80000; cnt++);       /* wait */
    PDR00++;                    /* counter... */
  }
}
```

Register: unknown register

```
RL0=012A0000  RL1=00000044  R12=00000000
RL3=00FE0000
RW0=0000  RW1=012A  RW2=0044  RW3=0000
RW4=0000  RW5=0000  RW6=0000  RW7=00FE
R0=00  R1=00  R2=00  R3=00  R4=00  R5=00
R6=FE  R7=00
A=00013880  AH=0001  AL=3880
PC=FE00E9  SSP=004540  USP=004546
DPR=42  DTB=00  ADB=00
PS=E0E4  ILM=7  RP=00  CCR=E4
I=1  S=1  T=0  N=0  Z=1  V=0  C=0
```

Memory: 0x2 (MB96346RW: __pdr02)

```
000000  FF00 FFFF FFFF FFFF  ........
000008  FFFF 00FF 0000 0000  ........
000010  0000 0000 0000 0000  ........
000018  0000 0000 0000 0000  ........
000020  00E3 4080 0015 4080  ...@...@
000028  600C 0000 0000 600C  .`.....`
```

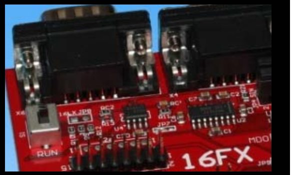
Breakpoints

Breakpoint	Module	Address	Flags
main + 0x30	main	FE00E9	XH

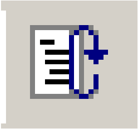
EUROS OS trace
No Trace Buffer found

Variable	Value	Type	Storage
cnt	80000	unsigned long	0x4240

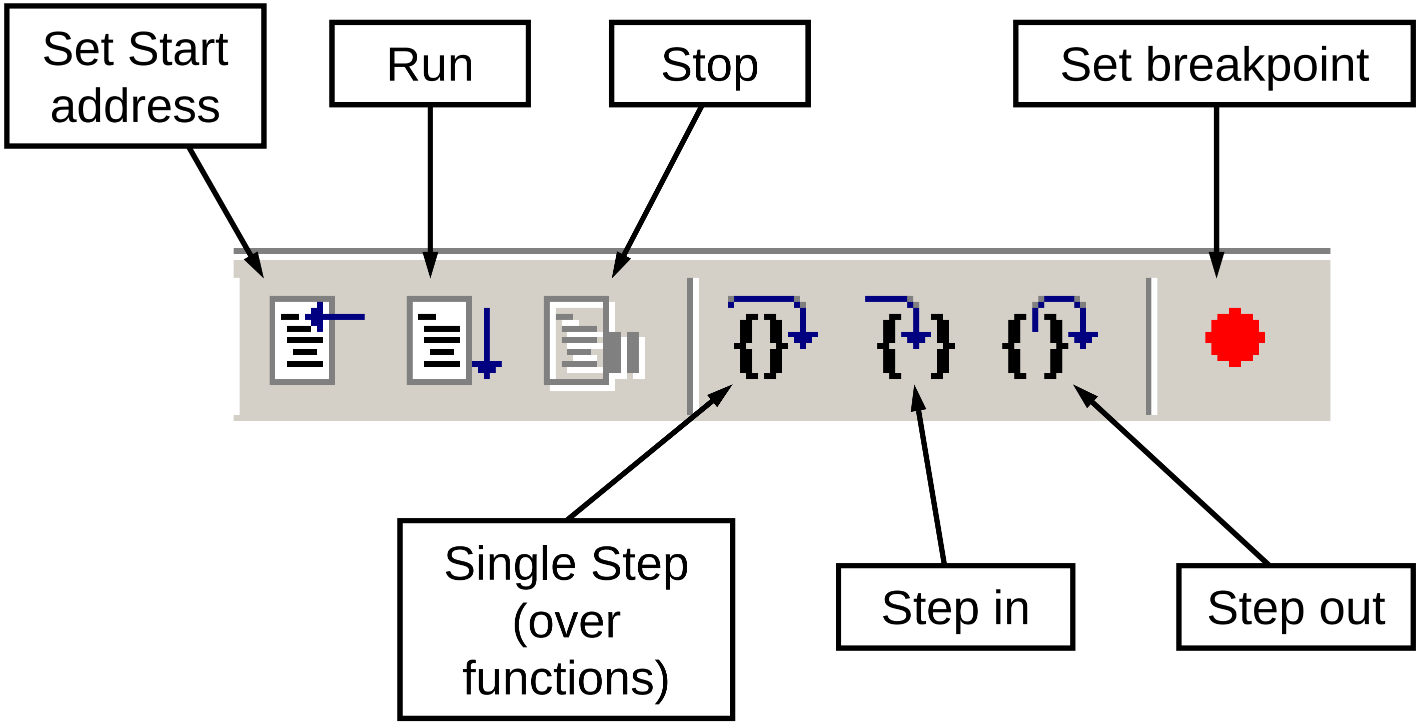
Stopped by Breakpoint | Ln 31, Col 2 | FFMC16LX | STOPPED | CONNECTED



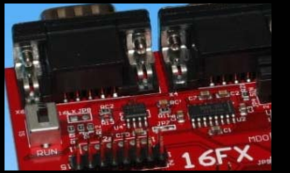
EUROScope lite 16FX Start Debugging

- Initialize target and run until main function
  - 

- Use menu bar for debugging



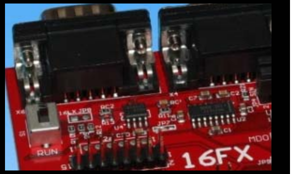
EUROScope lite 16FX Breakpoints



- **Set a breakpoint**
  - Double-click to desired line
    - ‚C‘ code source: selectables lines are marked by small dot in front
    - ‚Assembly‘ window: all lines with an instruction can hold a breakpoint
    - Some lines in source code window are grouped. When setting a breakpoint all grouped lines getting the red filled circle, but this is treated as only one breakpoint

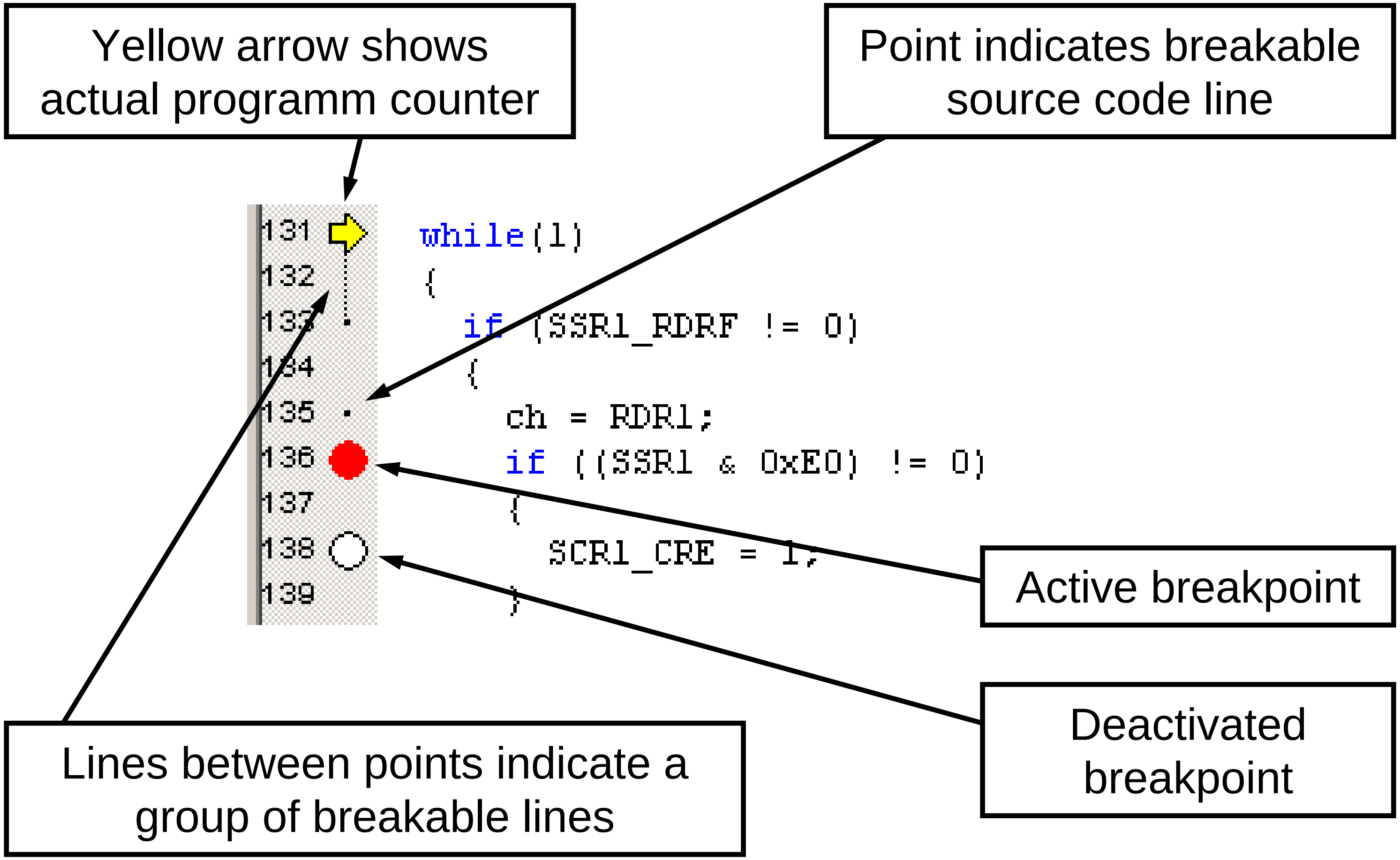
- **Activate/deactivate breakpoints**
  - Single-click to breakpoint

- **Delete breakpoint**
  - Double-click to breakpoint until red filled (or white filled) circel disappears



EUROScope lite 16FX Breakpoints

- **Short explanation of EUROScope source code window**



Yellow arrow shows actual programm counter

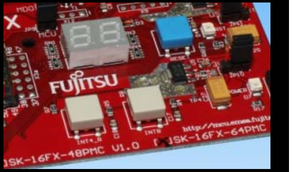
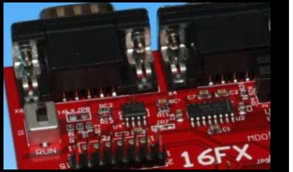
Point indicates breakable source code line

Active breakpoint

Deactivated breakpoint

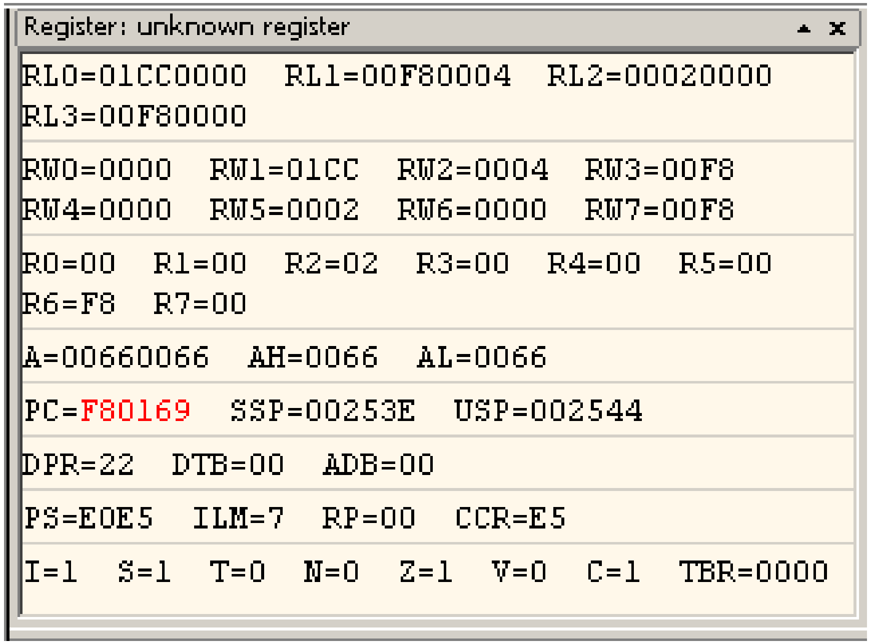
Lines between points indicate a group of breakable lines

```
while(1)
{
  if (SSR1_RDRF != 0)
  {
    ch = RDR1;
    if ((SSR1 & 0xE0) != 0)
    {
      SCR1_CRE = 1;
    }
```

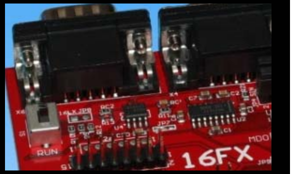
EUROScope lite 16FX Processor Status

- Processor window provides most important registers
- All processor flags are shown individually
- All values can be changed
- Window is updated on any stop or break of the application
- Changes in values are displayed in red due to prior update



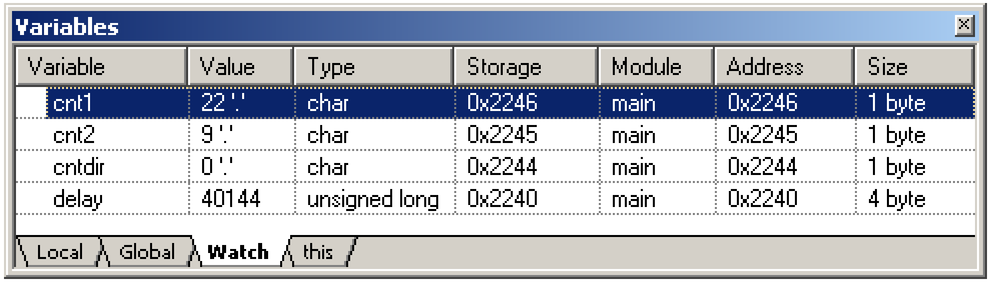
Register: unknown register

```
RL0=01CC0000  RL1=00F80004  RL2=00020000
RL3=00F80000

RW0=0000  RW1=01CC  RW2=0004  RW3=00F8
RW4=0000  RW5=0002  RW6=0000  RW7=00F8

R0=00  R1=00  R2=02  R3=00  R4=00  R5=00
R6=F8  R7=00

A=00660066  AH=0066  AL=0066

PC=F80169  SSP=00253E  USP=002544

DPR=22  DTB=00  ADB=00

PS=E0E5  ILM=7  RP=00  CCR=E5

I=1  S=1  T=0  N=0  Z=1  V=0  C=1  TBR=0000
```



EUROScope lite 16FX Variable Window

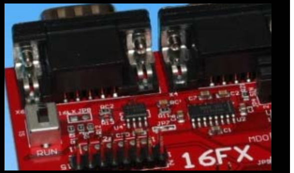
- **Local**
  - Local variables are automatically collected in view „Local“
- **Watch**
  - All local and up to 8 global variables can be added individually to the ‘Watch‘ window
- **Variables are updated on any stop or break of the application**
- **Changed values are displayed in red**
- **Variable values can be changed in ‘value‘ entry**



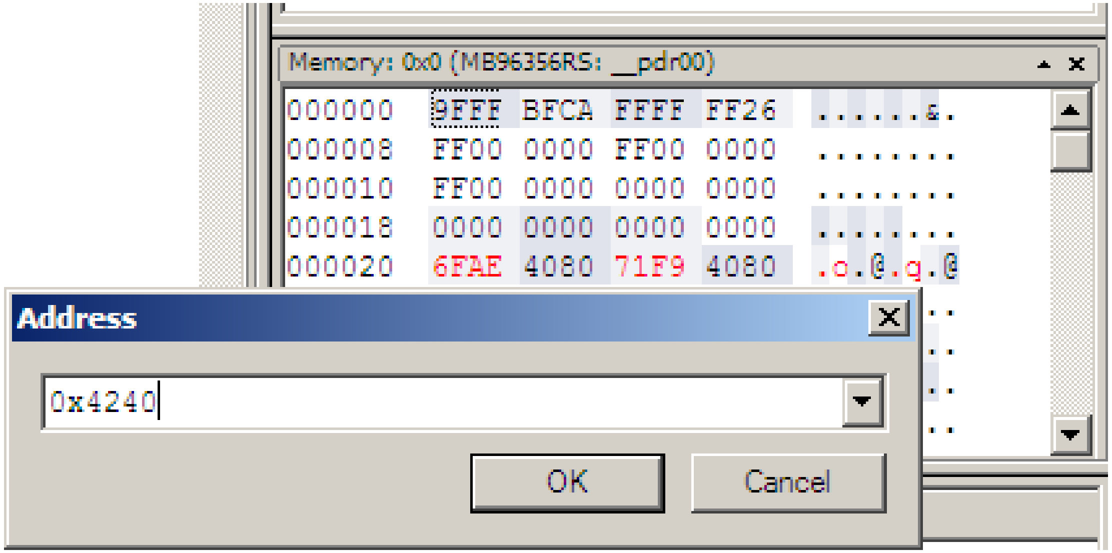
Variables

Variable	Value	Type	Storage	Module	Address	Size
cnt1	22 '.'	char	0x2246	main	0x2246	1 byte
cnt2	9 '.'	char	0x2245	main	0x2245	1 byte
cntdir	0 '.'	char	0x2244	main	0x2244	1 byte
delay	40144	unsigned long	0x2240	main	0x2240	4 byte

EUROScope lite 16FX Memory View



- Memory view is updated on every stop or break
- Value change is displayed in red due to prior update
- Memory content can be changed
- Memory can be filled with a user byte and size



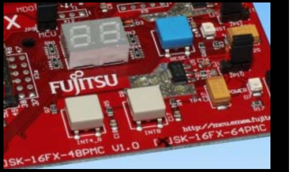
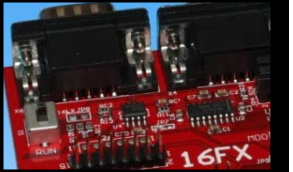
Memory: 0x0 (MB96356RS: __pdr00)

```
000000  9FFF BFCA FFFF FF26  ......&.
000008  FF00 0000 FF00 0000  ........
000010  FF00 0000 0000 0000  ........
000018  0000 0000 0000 0000  ........
000020  6FAE 4080 71F9 4080  .o.@.q.@
```

Address

0x4240

EUROScope lite 16FX Changing/Adding Source Window

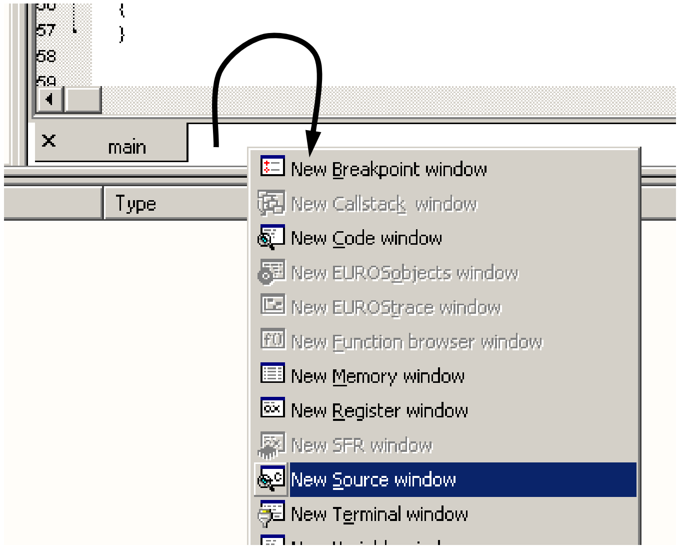



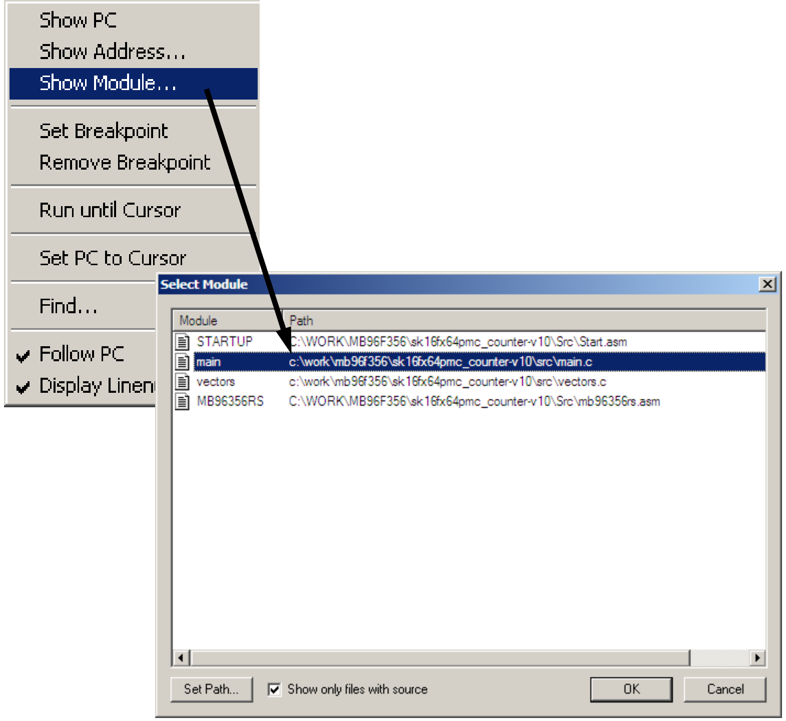
New source module window

- Go in window tab area and right-button click
- Choose „New Source window“

Change source window

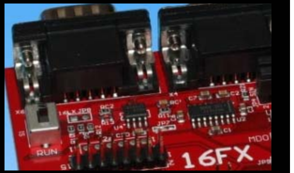
- Get menu by right-mouse-button-click in the source window
- Choose „Show Module...“
- Browse to Module File





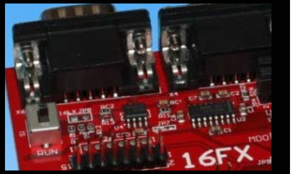
Module	Path
STARTUP	C:\WORK\MB96F356\sk16fx64pmc_counter-v10\Src\Start.asm
main	c:\work\mb96f356\sk16fx64pmc_counter-v10\src\main.c
vectors	c:\work\mb96f356\sk16fx64pmc_counter-v10\src\vectors.c
MB96356RS	C:\WORK\MB96F356\sk16fx64pmc_counter-v10\Src\mb96356rs.asm

EUROScope lite 16FX
Flash Programming

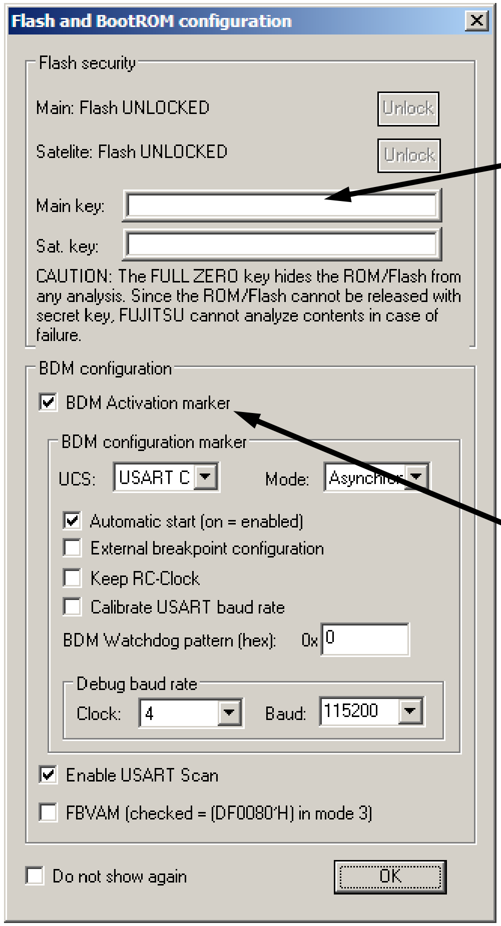


- **Flash programming is available via the Flash button:**
  - BDM configuration can be set before programming
  - Chip erase is supported
  - Flash programming is supported
  - User has to press reset button after Flash programming
  - Fujitsu Flash programming kernels are reused

EUROScope lite 16FX
BDM Configuration



- **Background debugging mode configuration**
- **Flash security unlock**



Flash and BootROM configuration

Flash security

Main: Flash UNLOCKED [Unlock]

Satelite: Flash UNLOCKED [Unlock]

Main key:

Sat. key:

CAUTION: The FULL ZERO key hides the ROM/Flash from any analysis. Since the ROM/Flash cannot be released with secret key, FUJITSU cannot analyze contents in case of failure.

BDM configuration

☑ BDM Activation marker

BDM configuration marker

UCS: USART C Mode: Asynchron

☑ Automatic start (on = enabled)

□ External breakpoint configuration

□ Keep RC-Clock

□ Calibrate USART baud rate

BDM Watchdog pattern (hex): 0x 0

Debug baud rate

Clock: 4 Baud: 115200

☑ Enable USART Scan

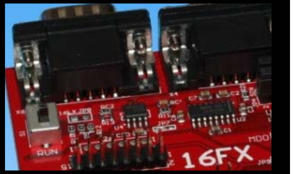
□ FBVAM (checked = (DF0080'H) in mode 3)

□ Do not show again [OK]

Flash security unlock keys

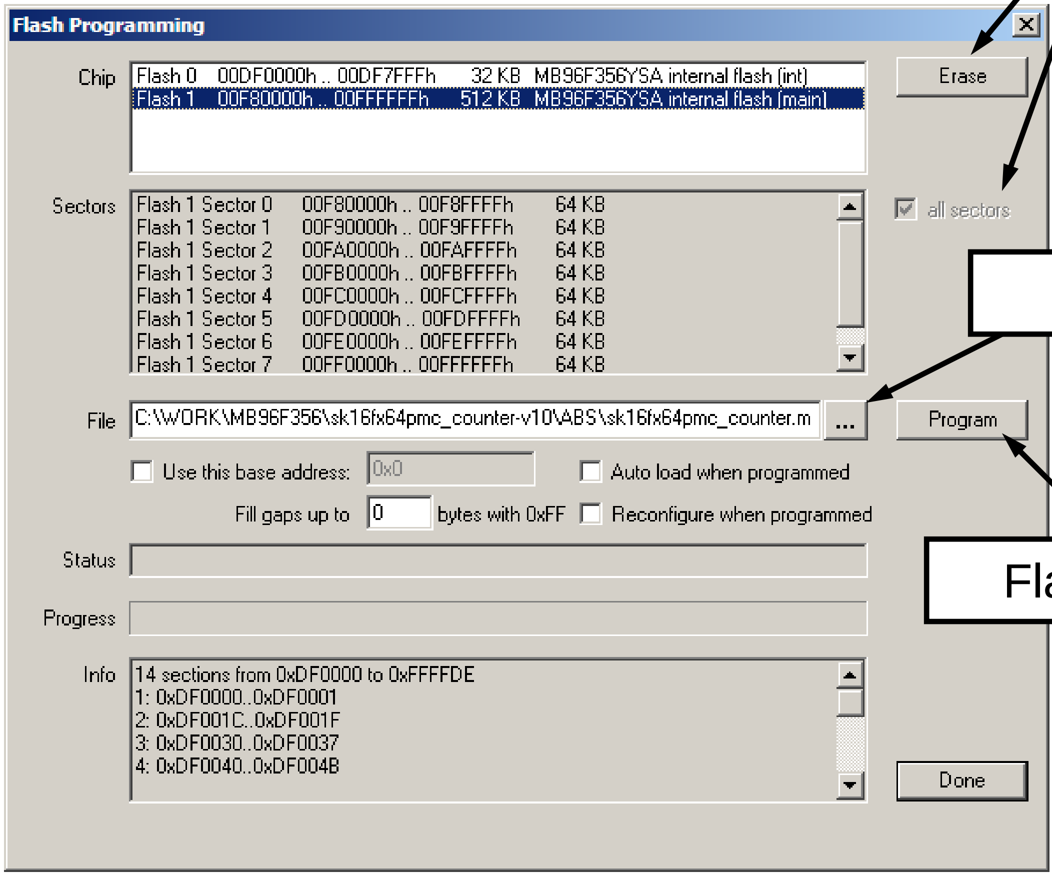
BDM Activation

[√] Use EUROScope configuration
[ ] Use MHX file configuration



EUROScope lite 16FX Flash Programming Dialog

- **Chip erase and Flash programming**
  - Click on ‚Done‘ and reset board after programming



Flash Programming

Chip

Flash 0	00DF0000h .. 00DF7FFFh	32 KB	MB96F356YSA internal flash (int)
Flash 1	00F80000h .. 00FFFFFFh	512 KB	MB96F356YSA internal flash (main)

Sectors

Flash 1 Sector 0	00F80000h .. 00F8FFFFh	64 KB
Flash 1 Sector 1	00F90000h .. 00F9FFFFh	64 KB
Flash 1 Sector 2	00FA0000h .. 00FAFFFFh	64 KB
Flash 1 Sector 3	00FB0000h .. 00FBFFFFh	64 KB
Flash 1 Sector 4	00FC0000h .. 00FCFFFFh	64 KB
Flash 1 Sector 5	00FD0000h .. 00FDFFFFh	64 KB
Flash 1 Sector 6	00FE0000h .. 00FEFFFFh	64 KB
Flash 1 Sector 7	00FF0000h .. 00FFFFFFh	64 KB

☑ all sectors

File C:\WORK\MB96F356\sk16fx64pmc_counter-v10\ABS\sk16fx64pmc_counter.m

☐ Use this base address: 0x0

☐ Auto load when programmed

Fill gaps up to 0 bytes with 0xFF

☐ Reconfigure when programmed

Status

Progress

Info

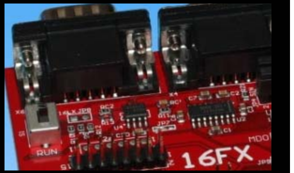
```
14 sections from 0xDF0000 to 0xFFFFDE
1: 0xDF0000..0xDF0001
2: 0xDF001C..0xDF001F
3: 0xDF0030..0xDF0037
4: 0xDF0040..0xDF004B
```

Chip erase (‚all sectors‘ must be checked)

Browse to MHX file

Flash programming

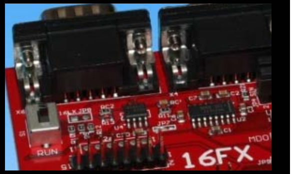
EUROScope lite 16FX Prospect



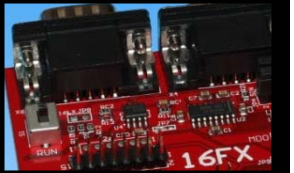
- **All SK-16FX-64PMC examples are configured as follows:**
  - UART2 for debugging
  - UART7_R may be used by the application
  - Asynchronous communication
  - 115200 Bits/s
  - Autorun after reset
  - No breakpoint predefinition

- **For more details of „EUROScope lite 16FX“ please refer to application note:**
  - mcu-an-300235-e-16fx_using_EUROScope

FreeRTOS^{TM}



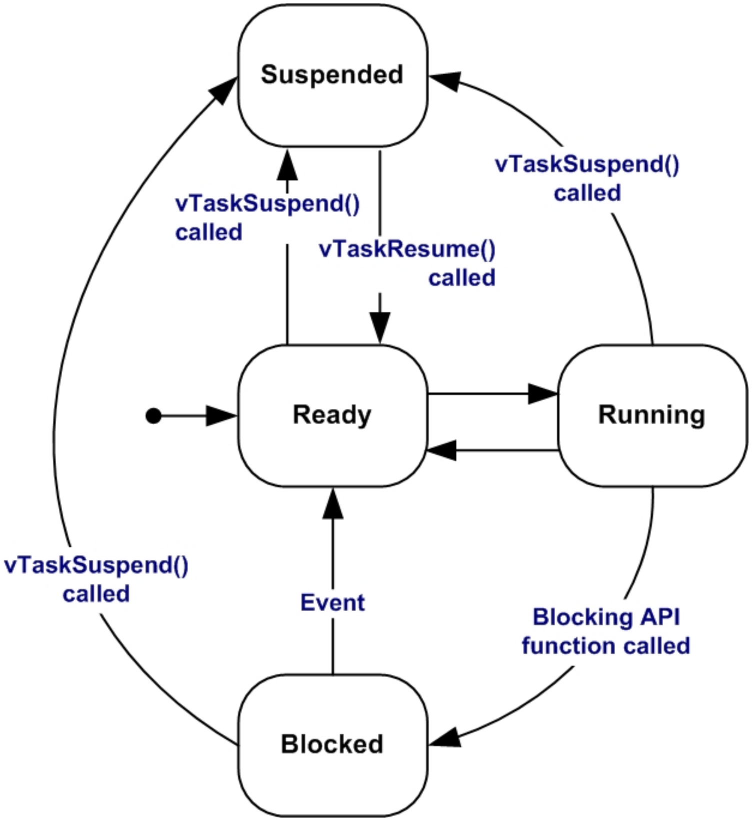
FreeRTOS^{TM}

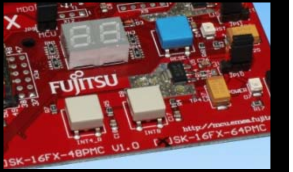


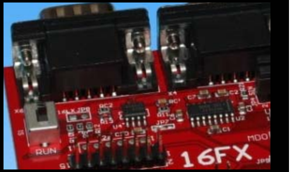
- **The most widely used open source real-time operating system for embedded microcontrollers**
- **It has the performance, quality and stability of a commercial product**
- **It is available through a very liberal distribution and licensing model which allows users to obtain and develop software with almost no restrictions**
- **Optional commercially licensed and supported versions are available through WITTENSTEIN**
- **Features:**
  - Designed specifically for microcontrollers
  - Powerful trace macros
  - Stack overflow protection
  - No restrictions on priority assignment
  - Safety certified version available – proving robustness
  - Tasks, co-routines, queues, binary semaphores, counting semaphores, recursive semaphores, mutexes, interrupt interaction primitives

FreeRTOS^{TM} - Tasks

- **Autonomous**
  - No knowledge of scheduler activity
  - A sequential process
  - Running on a ‘virtual processor’
  - Prioritised



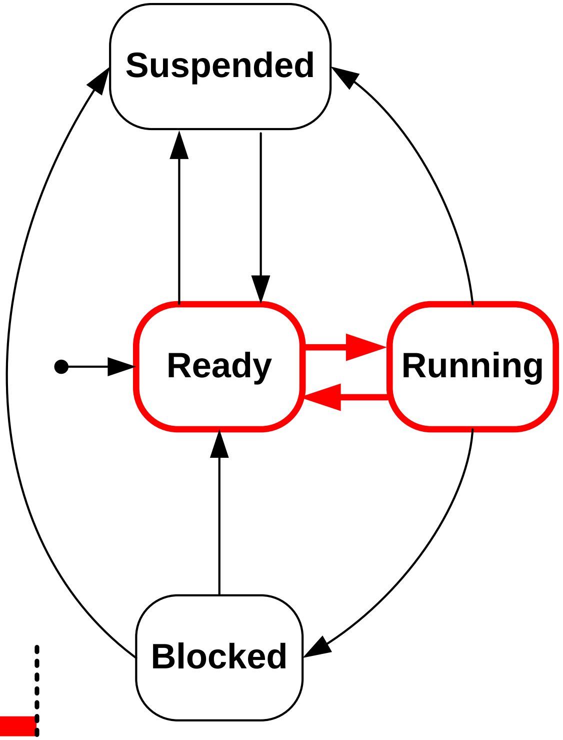


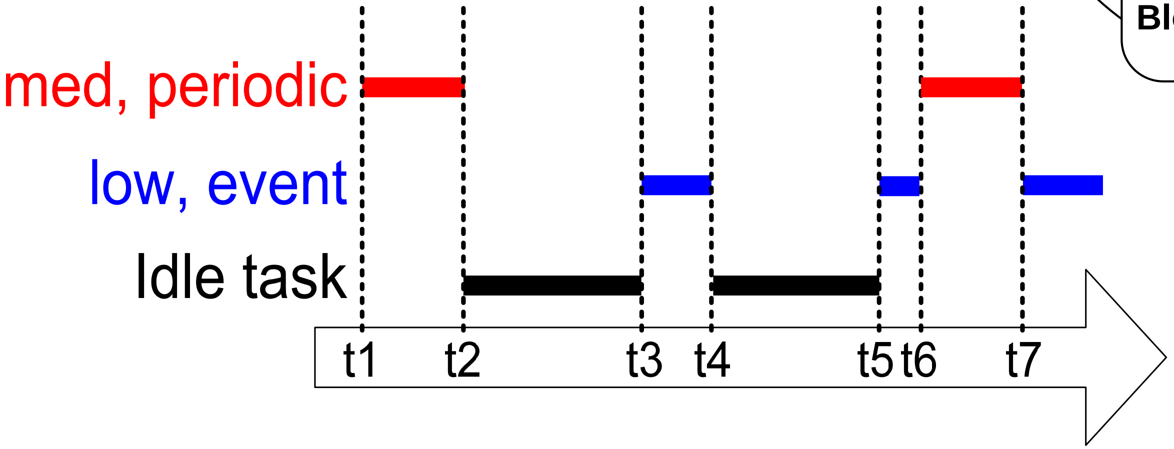


FreeRTOS™ - Multitasking

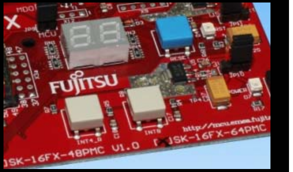
- **Prioritised Pre-emptive Multitasking**

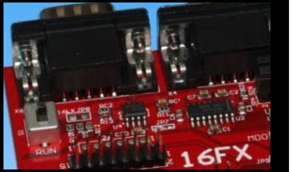
```
void aTask( void * pvParameters )
{
  for( ;; )
  {
    /* Task processing goes here. */
  }
  vTaskDelete( NULL );
}
```



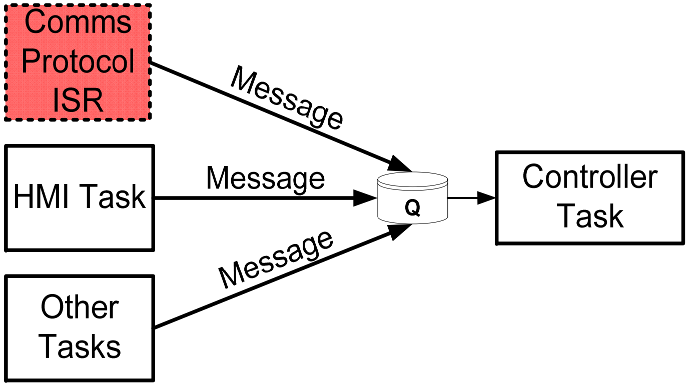


FreeRTOS™ - Queues



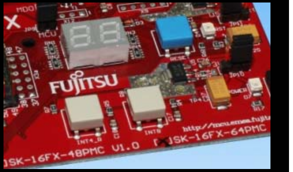


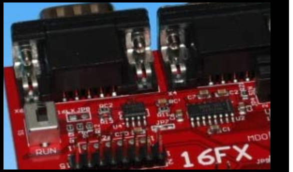
- **To be useful tasks must be able to communicate with each other**



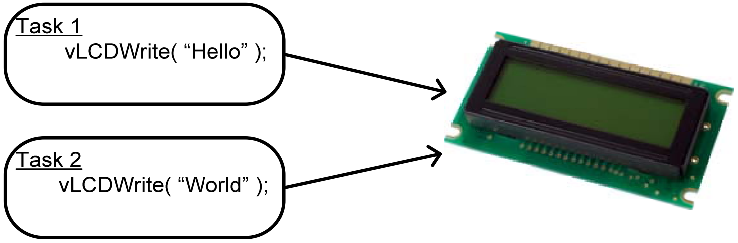
```
xQueueHandle xQueue; // Declare the queue

void vTask1( void *Param )
{
char cValueToWrite = 10;

    xQueue = xQueueCreate( 10, sizeof( char ) ); // Create queue

    for( ;; )  {
        xQueueSendToBack( xQueue, &cValueToWrite, 10 );
    }
}
/*----------------------------------------------------------*/
void vTask2( void *Param )
{
char cValueToReceive;

    for( ;; ) {
        xQueueReceive( xQueue, &cValueToReceive, 10 );
    }
}
```

FreeRTOS^{TM} - Mutexes

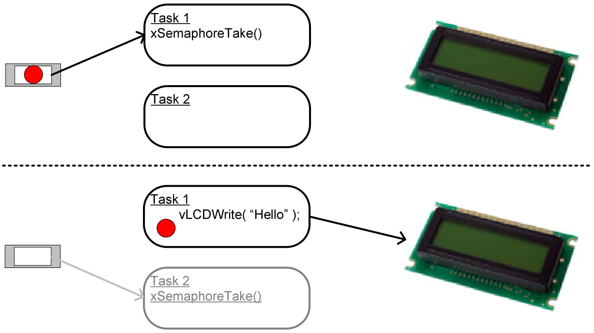




- **What happens when two tasks attempt to access the same resource?**

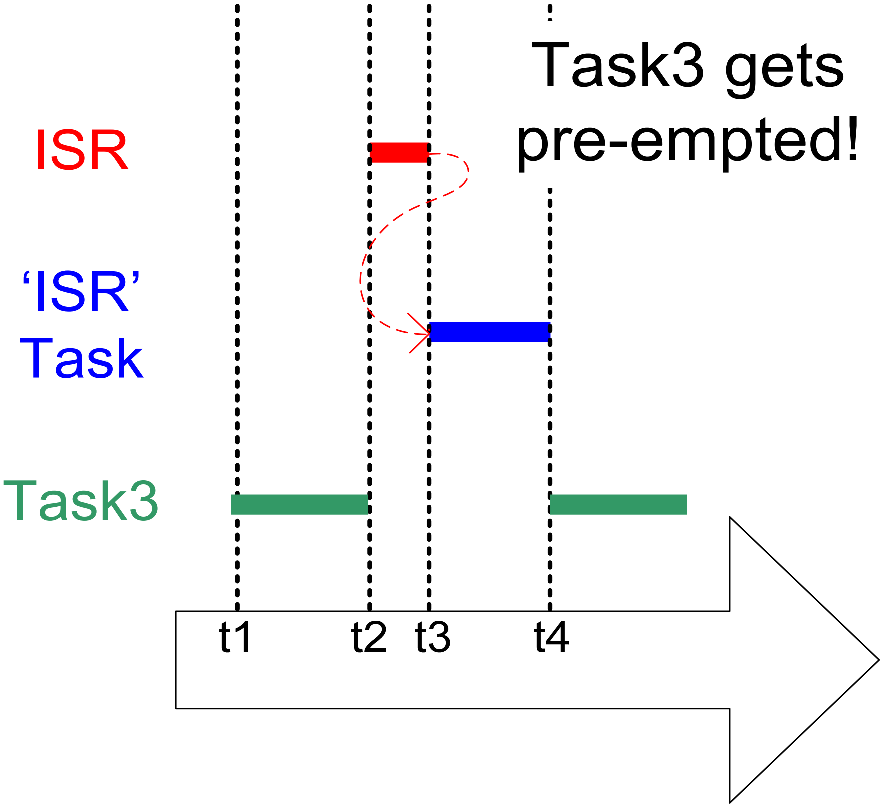


```
void vTask1( void * pvParameters )
{
  for( ;; )
  {
    /* Need access, get semaphore. */
    xSemaphoreTake( xSemaphore, BLOCK_FOREVER );
    vLCDWrite( “Hello” ); /* Access resource */
    /* Must remember to return semaphore. */
    vSemaphoreGive( xSemaphore );
  }
}

/***********************************************/

void vTask2( void * pvParameters )
{
  for( ;; )
  {
    xSemaphoreTake( xSemaphore, BLOCK_FOREVER );
    vLCDWrite( “World” ); /* Access resource */
    vSemaphoreGive( xSemaphore );
  }
}
```

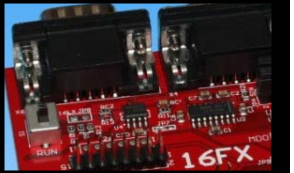


FreeRTOS^{TM} - Synchronisation

- **Tasks provide a convenient mechanism for processing asynchronous events**
- **Semaphores can be used to implement “Deferred Interrupt Handling”**

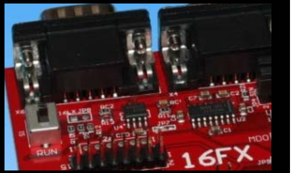


FreeRTOS^{TM} - Binary Semaphores



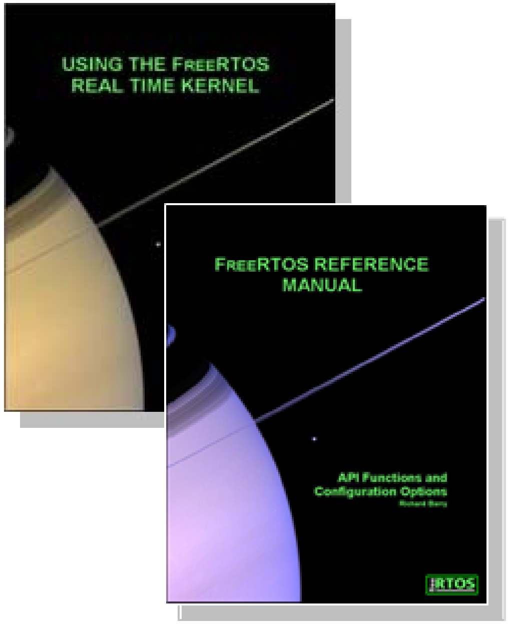
- The ISR only ‘gives’ the semaphore
- The task only ‘takes’ the semaphore

```
void vAnISR( void )
{
  xSemaphoreGiveFromISR( xSemaphore );
}

/************************************************/

void vTask2( void * pvParameters )
{
  for( ;; )
  {
    xSemaphoreTake( xSemaphore, portMAX_DELAY );
    /* Processing done here. */
  }
}
```



FreeRTOS^{TM}

- **FreeRTOS^{TM} - Operating System**
  - mini Real Time Kernel
  - open source
  - royalty free (also in commercial applications)
  - Free support by an active user community
  - http://www.freertos.org/

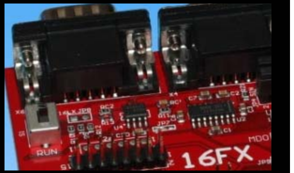


USING THE FREERTOS REAL TIME KERNEL

FREERTOS REFERENCE MANUAL

API Functions and Configuration Options

- **FreeRTOS^{TM} incl. one example is provided by this starterkit**
  - sk16fx64pmc_free_rtos_dice-v10
    - Two 7-segment displays are simulating two virtual dices

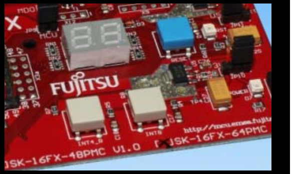
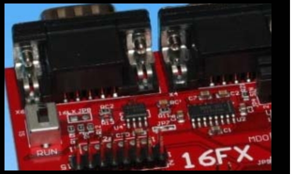


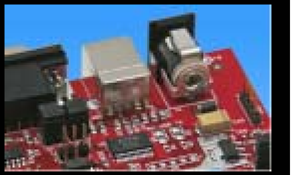
THE POSSIBILITIES ARE INFINITE

Further Steps

- **In order to learn more about Fujitsu's microcontrollers**
  - Visit our microcontroller website
    - http://mcu.emea.fujitsu.com
      - http://mcu.emea.fujitsu.com/mcu_product/detail/MB96F356RSBPMC.htm
  - See our application notes
    - http://mcu.emea.fujitsu.com/mcu_product/mcu_all_appnotes.htm
  - See our software examples
    - http://mcu.emea.fujitsu.com/mcu_product/mcu_all_software.htm

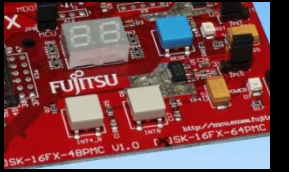
- **Contact your local distributor …**
  - for individual support
  - to register for our monthly 16FX seminar
  - to order the latest 'Fujitsu Micros DVD' containing all information regarding Fujitsu's 8-bit, 16-bit, and 32-bit microcontrollers

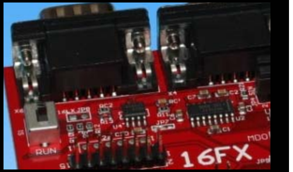





Optional Tools

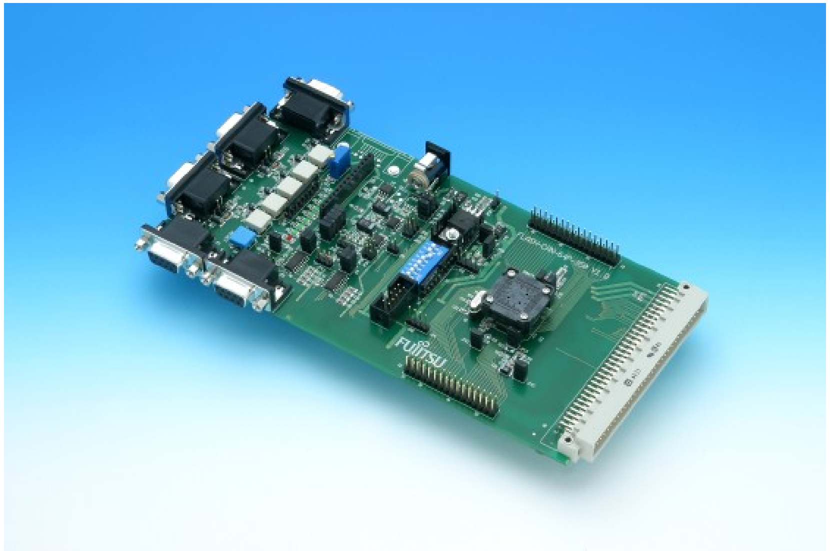
- **High-end evaluation board**
  - Flash-CAN-64P-350-PMC (Supports LQFP package M23)
- **Hardware emulator**
  - MB2198-01 + MB2198-500
  - Emulation chip MB96V300B
  - Probe header MB2198-504 for LQFP package M23
    - Socket NQPACK064SB, HQPACK064SB140
- **Programmer**
  - Conitec GALEP-4
- **Operating systems**



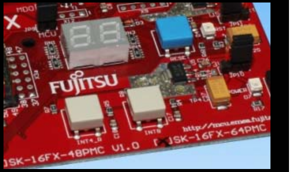


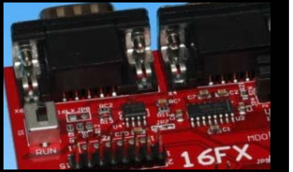
Evaluation Board

- **FLASH-CAN-64P-350-PMC V1.0**
  - Evaluation board for MB96350 Series (for LQFP package M23)
  - Emulator target board
  - Access to all on-chip peripherals
  - 2x UART
  - 1x CAN
  - 2x LIN
  - 8x ‘User’-LEDs
  - 5x ‘User’-Buttons
  - Flash-Kit connector
  - Connector for LC-Display
  - Example projects



Hardware Emulator

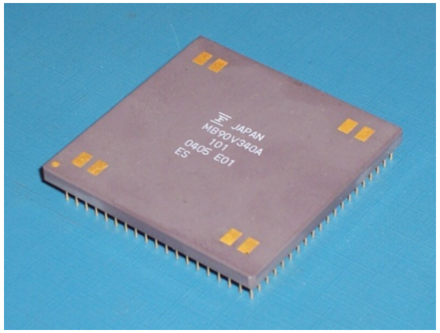




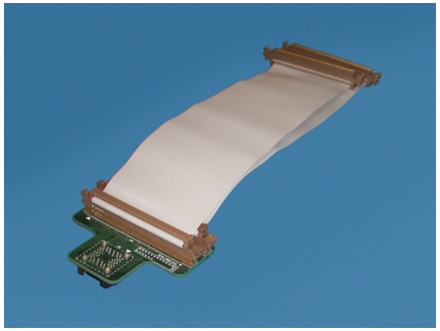
- **In-Circuit emulator for F2MC-16FX**
  - Main unit (MB2198-01), Adapter (MB2198-500), V-Chip (MB96V300B)
  - USB, LAN, and RS232 communication interface
  - Connected to target system via Fujitsu probe cable
  - High speed operating frequency
  - 2052 code / 4 data event breakpoints
  - Sequential breakpoints (4 conditions / 3 levels)
  - Trace function

Hardware Emulator

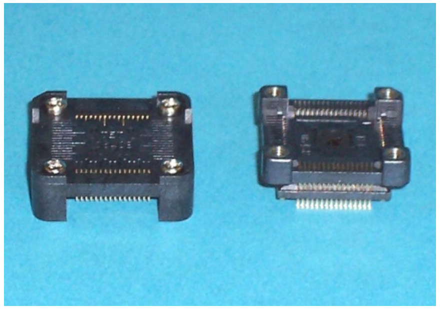
- **Emulation chip MB96V300B**
  - Superset supports all features of 16FX

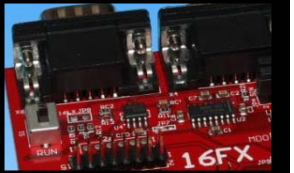


- **Probe header**
  - MB2198-504 for LQFP package M23

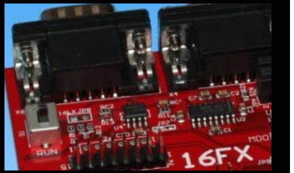


- **Socket for LQFP package M23**
  - NQPACK064SB, HQPACK064SB140

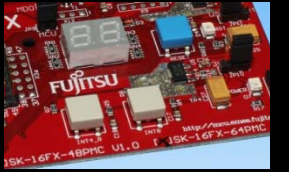


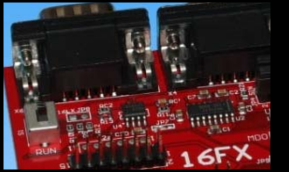


Programmer



- **GALEP-4 / GALEP-5**
  - Supports parallel programming
  - Supports serial synchronous and asynchronous programming
  - Optional programming cable for serial synchronous programming
  - Allows programming in volume production
  - www.conitec.com

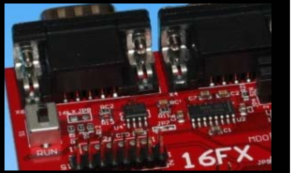




Operating Systems

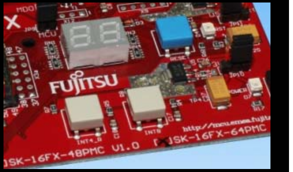
- **ProOSEK®**
  - Real-time operating system, OSEK/VDX
  - www.elektrobit.com
- **EUROS**
  - RTOS including TCP/IP, IrDA, IDE, CAN-Bus, CANopen, Profibus, etc.
  - www.euros-embedded.com
- **RTA-OSEK**
  - Realogy Real-Time Architect (RTA) ,OSEK, incl. timing analysis tool
  - www.etasgroup.com
- **embOS**
  - Small memory footprint for single-chip applications incl. PC viewer
  - www.segger.com
- **osCAN (OSEK/VDX)**
  - osCAN (OSEK/VDX) and further networking software CAN, LIN, FlexRay, etc.
  - www.vector-informatik.de
- **FreeRTOS**
  - Free and open source mini Real Time Scheduler
  - www.FreeRTOS.org

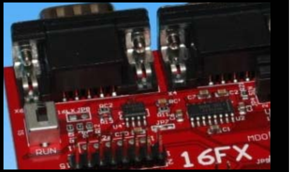
Contacts - Distribution



- European distributors

ATeG - Anatec AG	www.anatec.ch
ATeG - Anatronic S.A.	www.anatronic.com
ATeG - Ineltek GmbH	www.ineltek.com
EBV Elektronik GmbH	www.ebv.com
Glyn GmbH & Co. KG	www.glyn.de , www.glyn.ch
Malpassi srl	www.malpassi.it
Melchioni Electronica SpA	www.melchioni.it
PN Electronics	www.pne.fr
Rutronik	www.rutronik.com
Sagitrón	www.sagitron.es/english.htm

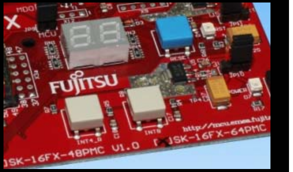


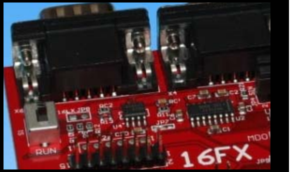


Fujitsu Semiconductor Europe

- **Germany (Headquarters)**
  - Pittlerstrasse 47, D-63225 Langen
  - Tel: (0 61 03) 69 00, Fax: (0 61 03) 69 01 22
- **France**
  - 2-12 Chemin des Femmes, F-91300 Massy
  - Tel: (01) 64 47 97 07, Fax: (01) 64 47 97 01
- **Italy**
  - Palazzo Pitagora – Milano 3 City, Via Ludovico il Moro 4B,
I-20080 Basiglio, Milano
  - Tel: (02) 90 45 02 1, Fax: (02) 90 75 00 87
- **United Kingdom**
  - Network House, Norreys Drive, Maidenhead, Berkshire SL6 4FJ
  - Tel: (01628) 50 46 00, Fax: (01628) 50 46 66
- **World Wide Web**
  - http://emea.fujitsu.com/semiconductor
  - http://mcu.emea.fujitsu.com
  - Contact: mcu_ticket.FSEU@de.fujitsu.com

EU-Konformitätserklärung / EU declaration of conformity





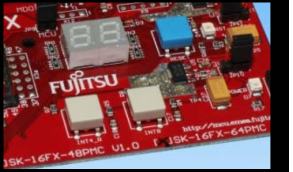
CE

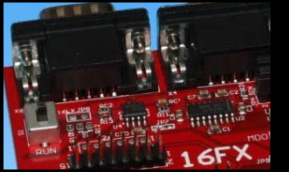
Hiermit erklären wir, Fujitsu Semiconductor Europe GmbH, Pittlerstrasse 47, 63225 Langen, Germany dass dieses Board aufgrund seiner Konzipierung und Bauart sowie in den von uns in Verkehr gebrachten Ausführung(en) den grundlegenden Anforderungen der EU-Richtlinie 2004/108/EC „Elektromagnetische Verträglichkeit“ 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.



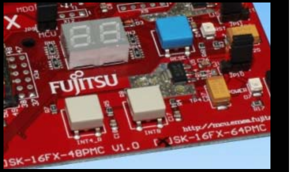


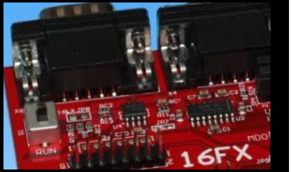
Recycling

- **Gültig für EU-Länder:**
  - Gemäß der Europäischen WEEE-Richtlinie und deren Umsetzung in landesspezifische Gesetze nehmen wir dieses Gerät wieder zurück.
  - Zur Entsorgung schicken Sie das Gerät bitte an die folgende Adresse:

- **Valid for European Union Countries:**
  - According to the European WEEE-Directive and its implementation into national laws we take this device back.
  - For disposal please send the device to the following address:

Fujitsu Semiconductor Europe GmbH
Warehouse/Disposal
Monzastraße 4a
D-63225 Langen





- **‘SK-16FX-64PMC’-CD Link-List**
  - Software
    - Softune Workbench
    - EUROScope lite 16FX
    - MCU Flash programmer
    - SKwizard
  - Software Examples
    - sk16fx64pmc_adc_dvm
    - sk16fx64pmc_can_uart_terminal
    - sk16fx64pmc_counter
    - sk16fx64pmc_template
    - sk16fx64pmc_uart
    - sk16fx64pmc_free_rtos_dice
    - sk16fx64pmc_uart_7seg
  - Documents
    - Schematic ‘SK-16FX-64PMC’
    - Data sheet MB96350 Series
    - Hardware manual 16FX Family
    - AppNote ‘16FX Hardware Setup’
    - AppNote ‘16FX Getting Started’
    - Customer Information 16FX
    - EUROScope Reference Manual
    - AppNote ‚EUROScope‘
    - Customer Information of ‚EUROScope‘ limitations