Starter kit User Guide

SK-FM3-100PMC-MB9BF516N

Hardware V1.1 / Documentation V1.3

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▪The use of the deliverables (deliverables shall include, but not limited to, software, application examples, hardware, target boards, evaluation boards, starter kits, schematics, engineering samples of IC's etc.) is subject to the terms and conditions of Spansion LLC and its affiliates ("SPANSION") as set out below and in (i) the terms and conditions of the License Agreement and/or the Sale and Purchase Agreement and/or any other agreement under which deliverables have been delivered, (ii) the technical descriptions and (iii) all accompanying written materials.

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▪3. Regarding hardware deliverables, the following limited warranty shall apply:

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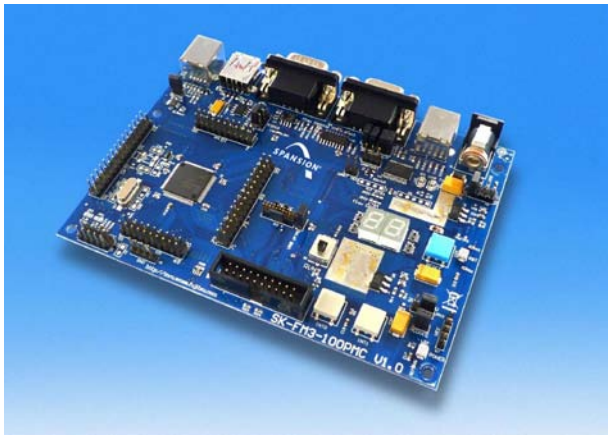
▪6. The contents of this document are subject to change by SPANSION without a prior notice, thus contact SPANSION about the latest one.

▪This board and its deliverables must only be used for test applications in an evaluation laboratory environment.

Information about this PDF document

- For your convenience this user guide includes external links that simplify installing of drivers, software utilities, and quick jumps to documentation.
- Some PDF viewer do not allow access to external content by links because of security reasons.
- A viewer called “PDF XChange” is provided in the software package of this starter kit. It’s use is free of charge and no additional installation is required.
- Launching “start.bat” opens this user guide in the PDF XChange viewer.
- Please ensure you have copied the complete software package related to this starter kit in order to use and run the links and examples given on the next pages.
- Please contact the Spansion Support in case of any question.

Overview



- **Introduction**
  - About The SK-FM3-100PMC-MB9BF516N
  - SK-FM3-100PMC-MB9BF516N content
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  - The Hardware
  - The Software
- **Try yourself**
  - Software examples
  - Program Download
  - IAR-Embedded Workbench
  - KEIL µVision
  - Solutions
- Workshops, Contacts & More

Additional documents

- Schematic
- Factsheet
- Data sheet MB9B510R Series
- Peripheral Manual and Errata
- Peripheral Manual (Timer Part) and Errata
- Peripheral Manual (Analog Part) and Errata
- Peripheral Manual (Communication Part) and Errata
- Flash Programming Manual and Errata

Please visit www.spansion.com to find latest releases of the above mentioned documents.

About the SK-FM3-100PMC-MB9BF516N

- The SK-FM3-100PMC-MB9BF516N is available in two versions:
  - The SK-FM3-100PMC-MB9BF516N includes a low-cost evaluation board based on the SPANSION FM3 microcontroller MB9B510 Series
  - SK-FM3-100PMC-9BF516N-JL includes a low-cost evaluation board based on the SPANSION FM3 microcontroller MB9B510 Series and the JTAG adapter J-Link

- The MB9B510 Series includes the following features:
  - Up to 512 KByte Flash Memory
  - 32 KByte Work Flash
  - Up to 64 KByte RAM
  - Up to 2 CAN controller 2.0A/B
  - Up to 8 LIN-USART-I²C interfaces
  - USB-Host/-Device interface
  - Timers (ICUs, OCUs, PPGs, others)
  - Three 12 Bit ADCs
  - External interrupts

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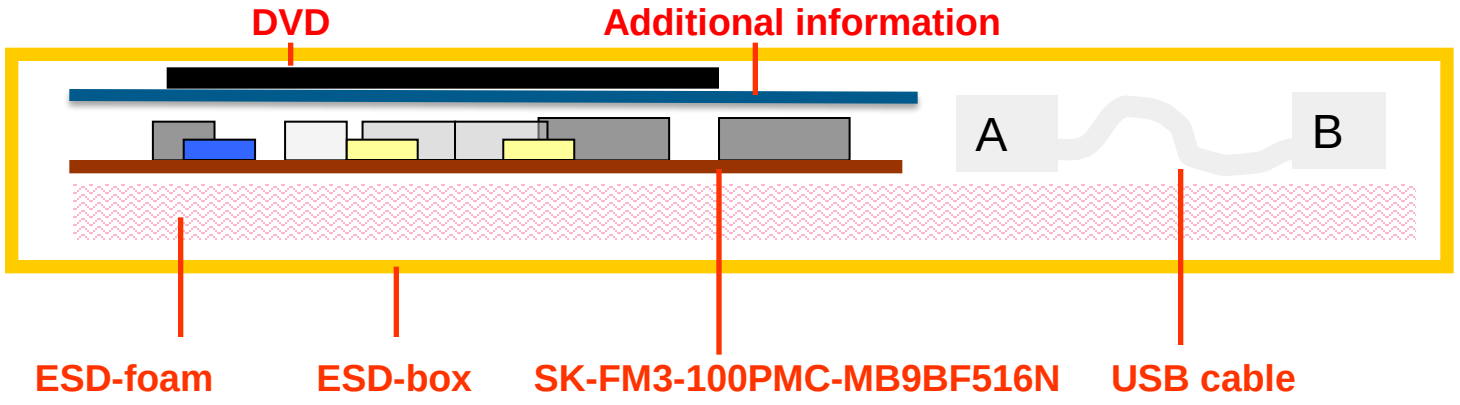
About the SK-FM3-100PMC-MB9BF516N

- Features of the SK-FM3-100PMC-MB9BF516N board:
  - Microcontroller MB9BF516N
  - 1x UART-Transceiver (SUB-D9 connector)
  - 1x USB to serial converter (Type-B connector)
  - 1x High-speed CAN-Transceiver (SUB-D9 connector)
  - 1x USB-MiniHost (Type-A connector)
  - 1x USB-Device (Type-B connector)
  - JTAG- and TRACE-Interface each on a 20 pin-header
  - TSC-Interface to connect for example the SPANSION SK-TSC-1127S-SB
  - 2x LED-Display (7-Segment)
  - 2x ‘User’-button
  - 1x ‘Reset’-button, ‘Reset’-LED
  - All 100 pins routed to pin-header
  - On-board 5V and 3V voltage regulators, ‘Power’-LED
  - Power supply via USB (UART’B’), USB-Device, JTAG or external with a 8V to 12V power connector

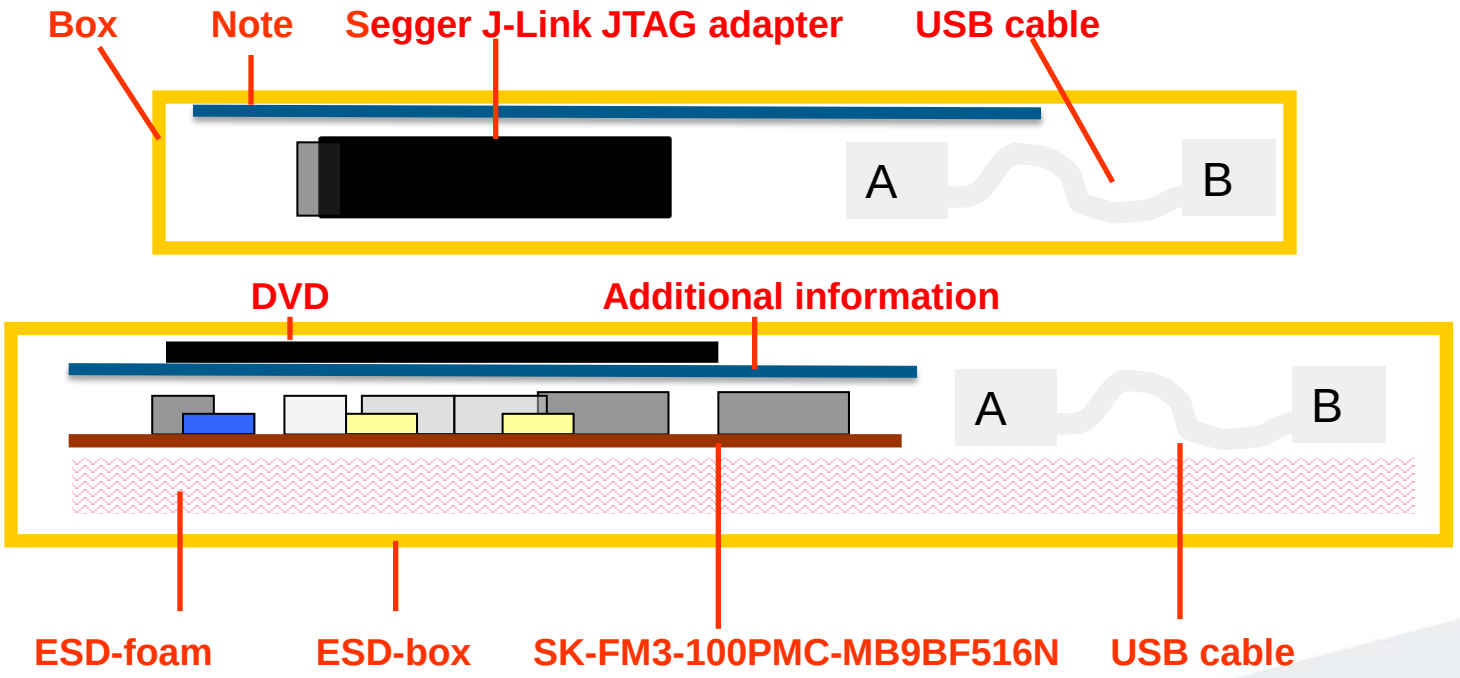
SK-FM3-100PMC-MB9BF516N content

- The SK-FM3-100PMC-MB9BF516N contains
  - SK-FM3-100PMC-MB9BF516N evaluation board with MB9BF516N
  - USB cable
  - DVD: Documentation, USB driver, Software examples, Programmer



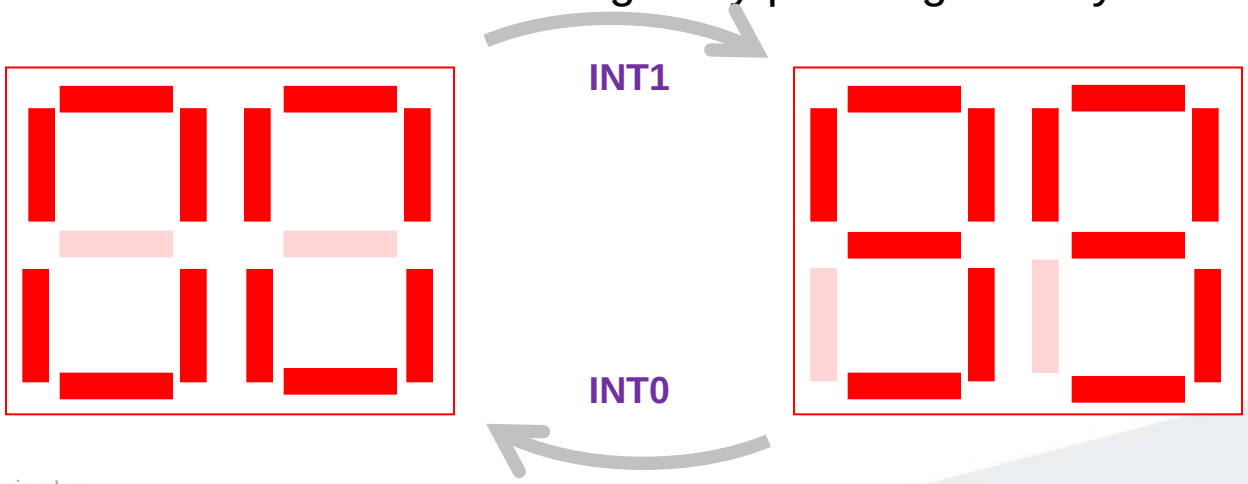
SK-FM3-100PMC-9BF516N-JL content

- The SK-FM3-100PMC-9BF516N-JL contains
  - SK-FM3-100PMC-MB9BF516N evaluation board with MB9BF516N
  - USB cable
  - DVD: Documentation, USB driver, Software examples, Programmer
  - Segger J-Link JTAG adapter incl. USB cable



Test it

- The microcontroller on the SK-FM3-100PMC-MB9BF516N is already preprogrammed with a simple application.
  - Install the USB driver from the DVD
  - Connect the SK-FM3-100PMC-MB9BF516N via USB (X5) with the PC , verify that jumper J5 is on the USBPWR position.
  - Press the ‚Reset‘- Button
  - The SK-FM3-100PMC-MB9BF516N will automatically start counting
  - The count direction can be changed by pressing the key buttons



Test it

Congratulations!

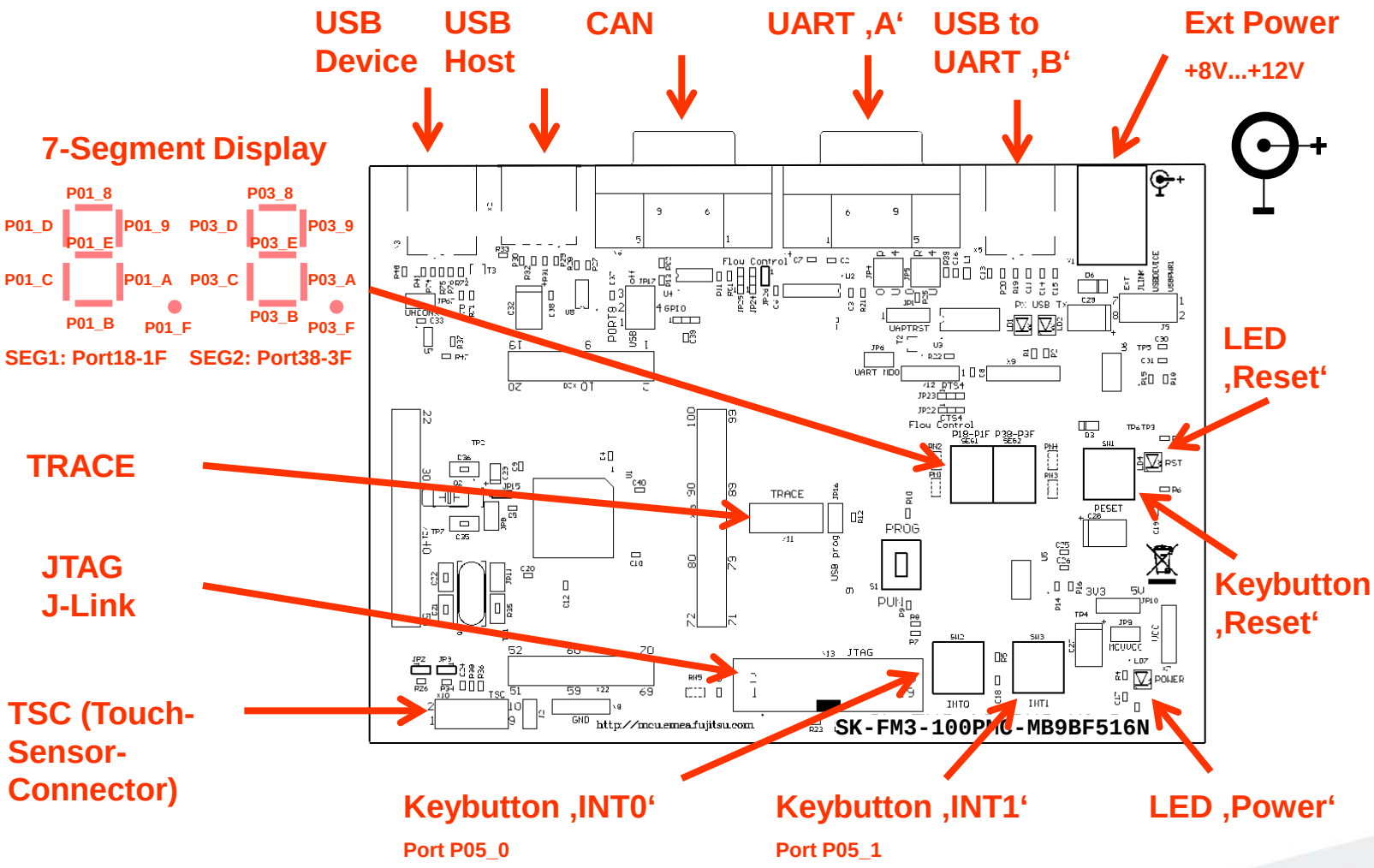
- You finished successfully the first test

- Now you will get more details about the SK-FM3-100PMC-MB9BF516N board

- You will learn more about
  - The on-board features
  - How to program the Flash
  - How to start with IAR-Embedded-Workbench and KEIL µVision

The Hardware

- Main features



The Hardware

- The jumpers

JP4: UART RX select

R-0: UART0=UART‘A‘ / U-4: UART4=UART‘B‘ (USB)

R-4: UART4=UART‘A‘ / U-0: UART0=UART‘B‘ (USB)

JP5: UART TX select

R-0: UART0=UART‘A‘ / U-4: UART4=UART‘B‘ (USB)

R-4: UART4=UART‘A‘ / U-0: UART0=UART‘B‘ (USB)

JP1: DTR-Reset

1-2: DTR-Signal of the UART connector is connected to the MCU reset-pin.

2-3: DTR-Signal of the USB connector is connected to the MCU reset-pin.

Some terminal-programs, e.g. SPANSION‘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

S1: Mode selection

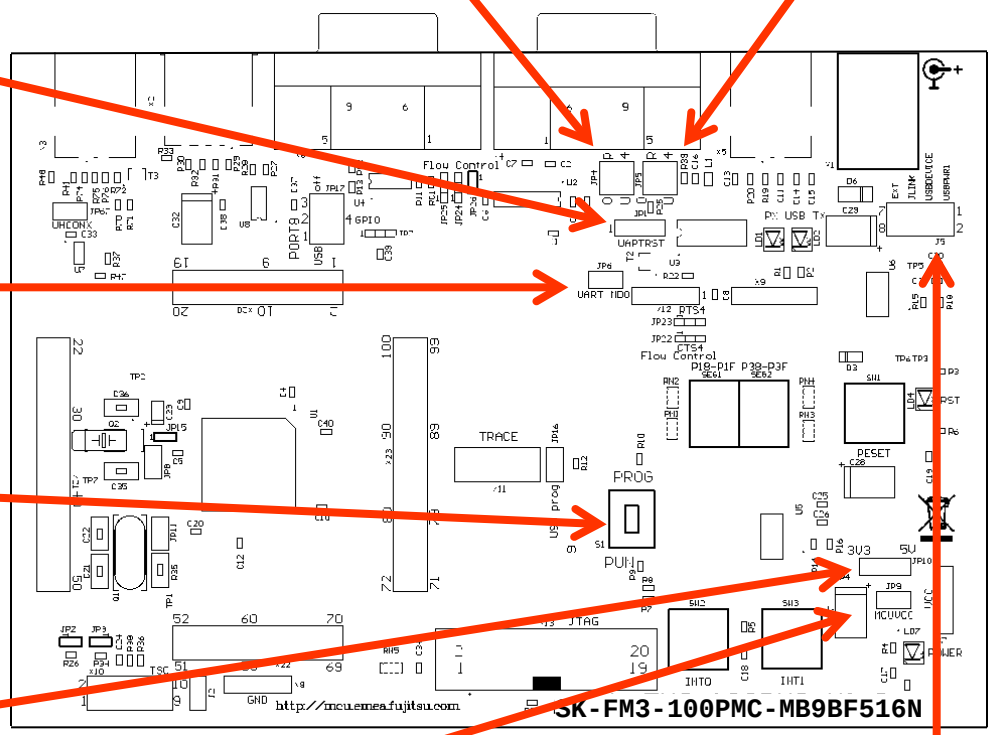
PROG: Program-mode

RUN: Run-mode

JP10: 5V / 3.3V

1-2: 5V supply is used

2-3: 3.3V supply is used



JP9: MCU Vcc

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

J5: Power Supply

1-2: USB (UART ‚B‘) supply

3-4: USB Device supply

5-6: JLINK supply

7-8: External supply

The Hardware

- The jumpers

JP24-JP26: Flow Control UART4

JP24
1-2: Flow control disabled
2-3: Flow control enabled

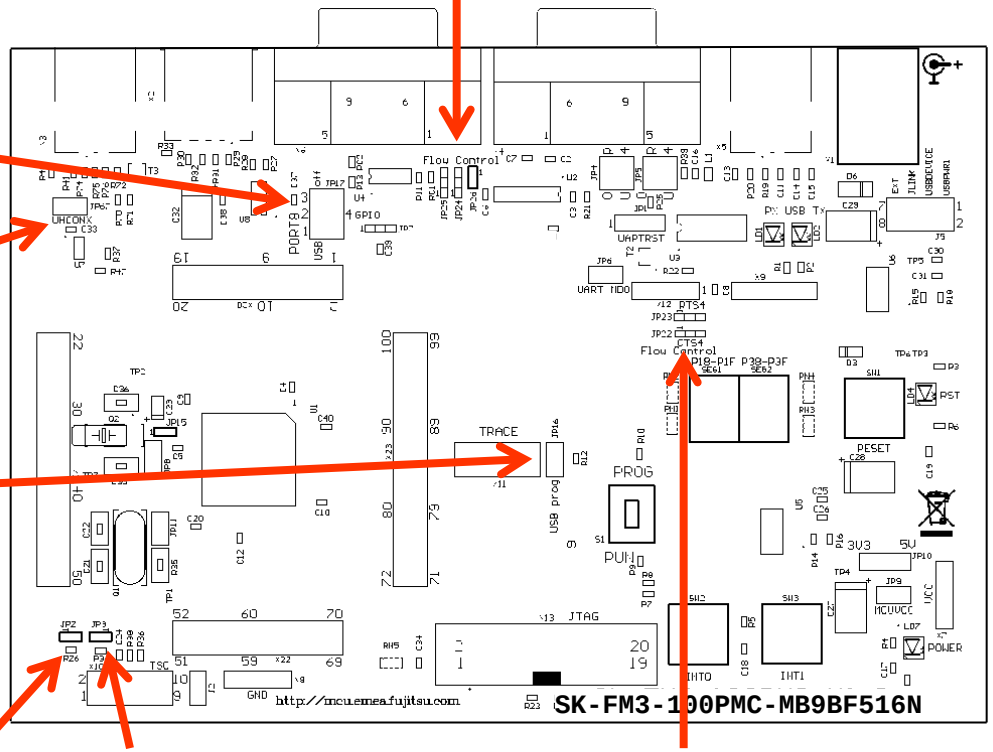
JP25
1-2: Flow control enabled
2-3: Flow control disabled

JP26
open: Flow control disabled
closed: Flow control enabled

JP17: Port8 (USB use)
1-2: USB in use
2-3: USB not in use
2-4: Use Port 8 as digital I/O

JP67: USB Function HCONX
Open: D+ is not pulled up
Closed: HCONX controls Pullup of D+

JP16: USB prog
(for PROG-Mode S1)
Open: UART programming enabled
Closed: USB programming enabled



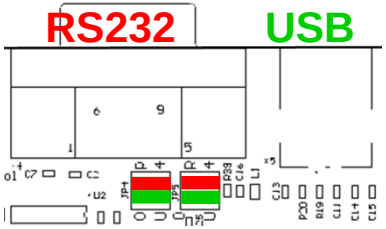
JP2: Pullup resistor TSC
Closed: Pull up SCL3

JP3: Pullup resistor TSC
Closed: Pull up SDA3

JP22,JP23: Flow Conrol CTS4, DTS4
JP22, JP23 1-2: Flow control on UART'A'
JP22, JP23 2-3: Flow control on UART'B'
JP22, JP23 Open: Flow control disabled

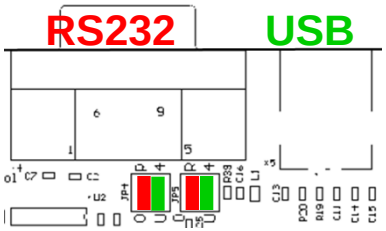
The Hardware

- JP4, JP5 : UART selection
  - UART0 and UART4 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
  - UART0 = USB-connector (X5), UART4 = Sub-D9 (X4) (default)
    - Setting of Jumper JP4 and JP5: U-0 / R-4



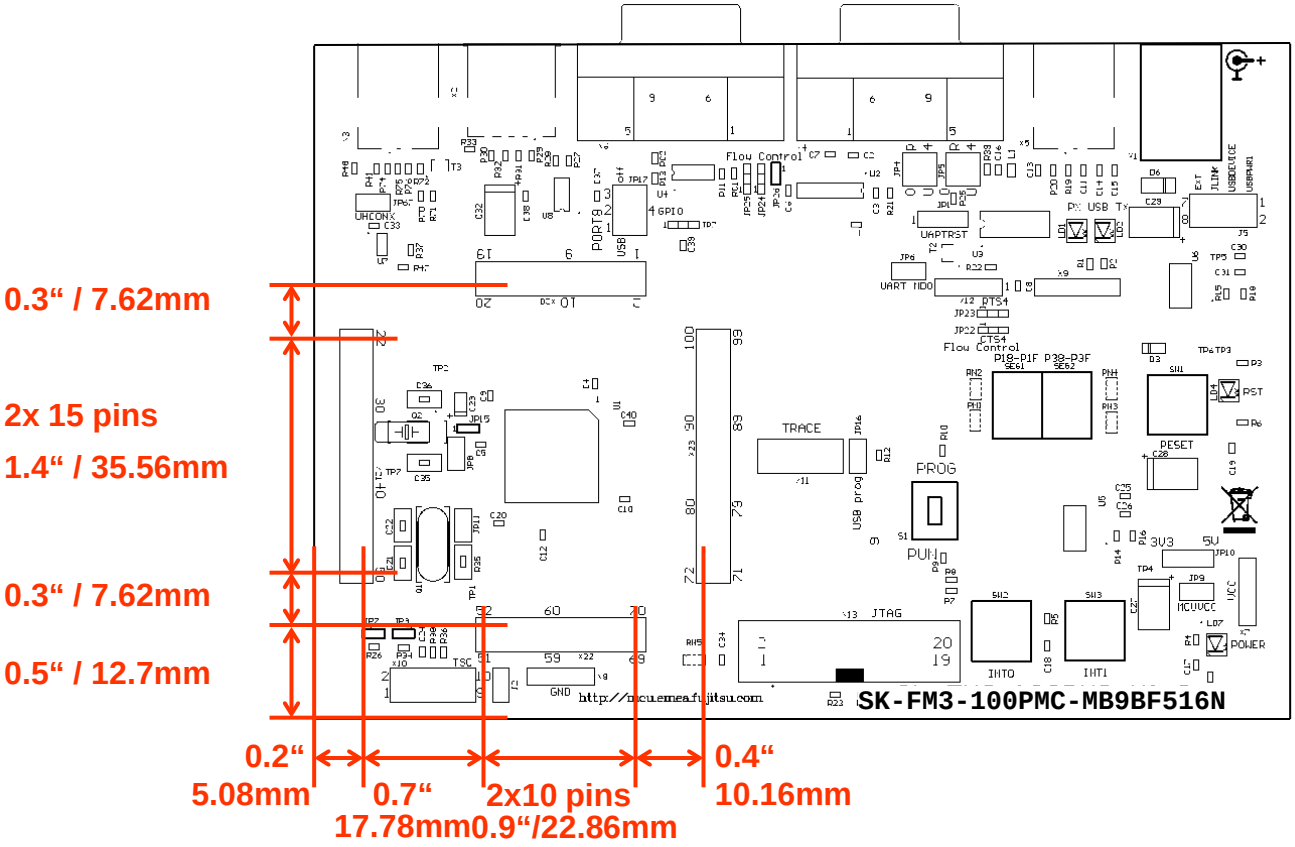
(default)

  - UART0 = Sub-D9 (X4), UART4 = USB-connector (X5)
    - Setting of Jumper JP4 and JP5: U-4 / R-0



The Hardware

- Extension headers X20-X23
  - Standard 0.1” / 2.54mm grid for use with prototype boards



The Hardware

- The microcontroller pins

Pin	Pin-name	Pin-Function on SK-FM-100PMC-MB9BF516N
1	VCC	MCUVCC
2	P50/INT00_0/AIN0_2/SIN3_1/RTO10_0/ MADATA00_0	Key button ‘INT0’
3	P51/INT01_0/BIN0_2/SOT3_1/RTO11_0/ MADATA01_0	Key button ‘INT1’
4	P52/INT02_0/ZIN0_2/SCK3_1/RTO12_0/ MADATA02_0	USB current limitation‘INT2’
5	P53/SIN6_0/TIOA1_2/INT07_2/RTO13_0 /MADATA03_0	
6	P54/SOT6_0/TIOB1_2/RTO14_0/MADAT A04_0	
7	P55/SCK6_0/ADTG_1/RTO15_0/MADAT A05_0	
8	P56/INT08_2/DTTI1X_0/MADATA06_0	
9	P30/AIN0_0/TIOB0_1/INT03_2/MADATA 07_0	
10	P31/BIN0_0/TIOB1_1/SCK6_1/INT04_2/ MADATA08_0	

Pin	Pin-name	Pin-Function on SK-FM-100PMC-MB9BF516N
11	P32/ZIN0_0/TIOB2_1/SOT6_1/INT05_2/ MADATA09_0	
12	P33/INT04_0/TIOB3_1/SIN6_1/ADTG_6/ MADATA10_0	
13	P34/FRCK0_0/TIOB4_1/TX0_1/MADAT A11_0	CAN0 TX
14	P35/IC03_0/TIOB5_1/RX0_1/INT08_1/M ADATA12_0	CAN0 RX
15	P36/IC02_0/SIN5_2/INT09_1/MADATA1 3_0	
16	P37/IC01_0/SOT5_2/INT10_1/MADATA1 4_0	
17	P38/IC00_0/SCK5_2/INT11_1/MADATA1 5_0	SEG2-A
18	P39/DTTI0X_0/ADTG_2	SEG2-B
19	P3A/RTO00_0/TIOA0_1/RTCCO_2/SUB OUT_2	SEG2-C
20	P3B/RTO01_0/TIOA1_1	SEG2-D

The Hardware

- The microcontroller pins (cont‘d)

Pin	Pin-name	Pin-Function on SK-FM-100PMC-MB9BF516N
21	P3C/RTO02_0/TIOA2_1	SEG2-E
22	P3D/RTO03_0/TIOA3_1	SEG2-F
23	P3E/RTO04_0/TIOA4_1	SEG2-G
24	P3F/RTO05_0/TIOA5_1	SEG2-DP
25	VSS	GND
26	VCC	MCUVCC
27	P40/TIOA0_0/RTO10_1/INT12_1	TINT TSC-Connector ‘INT12’
28	P41/TIOA1_0/RTO11_1/INT13_1	GINT TSC-Connector ‘INT13’
29	P42/TIOA2_0/RTO12_1	
30	P43/TIOA3_0/RTO13_1/ADTG_7	

Pin	Pin-name	Pin-Function on SK-FM-100PMC-MB9BF516N
31	P44/TIOA4_0/RTO14_1/MAD00_0	
32	P45/TIOA5_0/RTO15_1/MAD01_0	
33	C	‘C’ capacitor
34	VSS	GND
35	VCC	MCUVCC
36	P46/X0A	Subclock (optional)
37	P47/X1A	Subclock (optional)
38	INITX	Key button ‚Reset‘
39	P48/DTTI1X_1/INT14_1/SIN3_2/MAD02_0	
40	P49/TIOB0_0/IC10_1/AIN0_1/SOT3_2/MAD03_0	SDA3 TSC-Connector

The Hardware

- The microcontroller pins (cont‘d)

Pin	Pin-name	Pin-Function on SK-FM-100PMC-MB9BF516N
41	P4A/TIOB1_0/IC11_1/BIN0_1/SCK3_2/MAD04_0	SCL3 TSC-Connector
42	P4B/TIOB2_0/IC12_1/ZIN0_1/MAD05_0	
43	P4C/TIOB3_0/IC13_1/SCK7_1/AIN1_2/MAD06_0	
44	P4D/TIOB4_0/FRCK1_1/SOT7_1/BIN1_2/MAD07_0	
45	P4E/TIOB5_0/INT06_2/SIN7_1/ZIN1_2/MAD08_0	
46	PE0/MD1	GND
47	MD0	Mode-Switch S1
48	PE2/X0	4 MHz Crystal
49	PE3/X1	4 MHz Crystal
50	VSS	GND

Pin	Pin-name	Pin-Function on SK-FM-100PMC-MB9BF516N
51	VCC	MCUVCC
52	P10/AN00	
53	P11/AN01/SIN1_1/INT02_1/RX1_2/FRCK0_2/MAD09_0	
54	P12/AN02/SOT1_1/TX1_2/IC00_2/MAD10_0	
55	P13/AN03/SCK1_1/RTCCO_1/SUBOUT_1/IC01_2/MAD11_0	
56	P14/AN04/SIN0_1/INT03_1/IC02_2/MAD12_0	
57	P15/AN05/SOT0_1/IC03_2/MAD13_0	
58	P16/AN06/SCK0_1/MAD14_0	
59	P17/AN07/SIN2_2/INT04_1/MAD15_0	
60	AVCC	MCUVCC

The Hardware

- The microcontroller pins (cont'd)

Pin	Pin-name	Pin-Function on SK-FM-100PMC - MB9BF516N
61	AVRH	MCUVCC
62	AVSS	GND
63	P18/AN08/SOT2_2/MAD16_0	SEG1-A
64	P19/AN09/SCK2_2/MAD17_0	SEG1-B
65	P1A/AN10/SIN4_1/INT05_1/IC00_1/MAD 18_0	SEG1-C
66	P1B/AN11/SOT4_1/IC01_1/MAD19_0	SEG1-D
67	P1C/AN12/SCK4_1/IC02_1/MAD20_0	SEG1-E
68	P1D/AN13/CTS4_1/IC03_1/MAD21_0	SEG1-F
69	P1E/AN14/RTS4_1/DTTI0X_1/MAD22_0	SEG1-G
70	P1F/AN15/ADTG_5/FRCK0_1/MAD23_0	SEG1-DP

Pin	Pin-name	Pin-Function on SK-FM-100PMC- MB9BF516N
71	P23/SCK0_0/TIOA7_1	
72	P22/SOT0_0/TIOB7_1/ZIN1_1	UART0 (TXD)
73	P21/SIN0_0/INT06_1/BIN1_1	UART0 (RXD)
74	P20/INT05_0/CROUT_0/AIN1_1/MAD24 _0	Reset TSC-Connector
75	VSS	GND
76	VCC	MCUVCC
77	P00/TRSTX/MCSX7_0	JTAG TRSTX
78	P01/TCK/SWCLK	JTAG/TRACE TCK
79	P02/TDI/MCSX6_0	JTAG/TRACE TDI
80	P03/TMS/SWDIO	JTAG/TRACE TMS

The Hardware

- The microcontroller pins (cont‘d)

Pin	Pin-name	Pin-Function on SK-FM-100PMC-MB9BF516N
81	P04/TDO/SWO	JTAG/TRACE TDO
82	P05/TRACED0/TIOA5_2/SIN4_2/INT00_1/MCSX5_0	TRACE TRACED0
83	P06/TRACED1/TIOB5_2/SOT4_2/INT01_1/AIN2_1/MCSX4_0	TRACE TRACED1
84	P07/TRACED2/ADTG_0/SCK4_2/BIN2_1/MCLKOUT_0	TRACE TRACED2
85	P08/TRACED3/TIOA0_2/CTS4_2/ZIN2_1/MCSX3_0	TRACE TRACED3
86	P09/TRACECLK/TIOB0_2/RTS4_2/RTO20_1/MCSX2_0	TRACE TRACECLK
87	P0A/SIN4_0/INT00_2/FRCK1_0/FRCK2_0/RTO21_1/MCSX1_0	UART4 (RXD)
88	P0B/SOT4_0/TIOB6_1/IC10_0/IC20_0/RTO22_1/MCSX0_0	UART4 (TXD)
89	P0C/SCK4_0/TIOA6_1/IC11_0/IC21_0/RTO23_1/MALE_0	
90	P0D/RTS4_0/TIOA3_2/IC12_0/IC22_0/RTO24_1/MDQM0_0	RTS4 Flow control

Pin	Pin-name	Pin-Function on SK-FM-100PMC-MB9BF516N
91	P0E/CTS4_0/TIOB3_2/IC13_0/IC23_0/RTO25_1/MDQM1_0	CTS4 Flow control
92	P0F/NMIX/CROUT_1/RTCCO_0/DTTI2X_0/DTTI2X_1/SUBOUT_0	
93	P63/INT03_0/SIN5_1/RX0_2/MWEX_0	USB-Switch Device/Host
94	P62/SCK5_0/ADTG_3/TX0_2/MOEX_0	Current limit-ation enable
95	P61/SOT5_0/TIOB2_2/UHCONX	USB UHCONX
96	P60/SIN5_0/TIOA2_2/INT15_1/MRDY_0	Mode-Switch S1
97	USBVCC	USB-power supply
98	P80/UDM0	USB Data-
99	P81/UDP0	USB Data+
100	VSS	GND

The Software

- The SK-FM3-100PMC-MB9BF516N DVD includes the following software:
  - MCU Flash programming tools
    - FLASH MCU Programmer for FM3
    - FLASH USB DIRECT Programmer
  - USB driver for on-board USB-to-RS232 converter
  - The terminal program ‚Serial Port Viewer‘
  - The USB configuration tool ‚USB Wizard‘
  - Software examples for the SK-FM3-100PMC-MB9BF516N

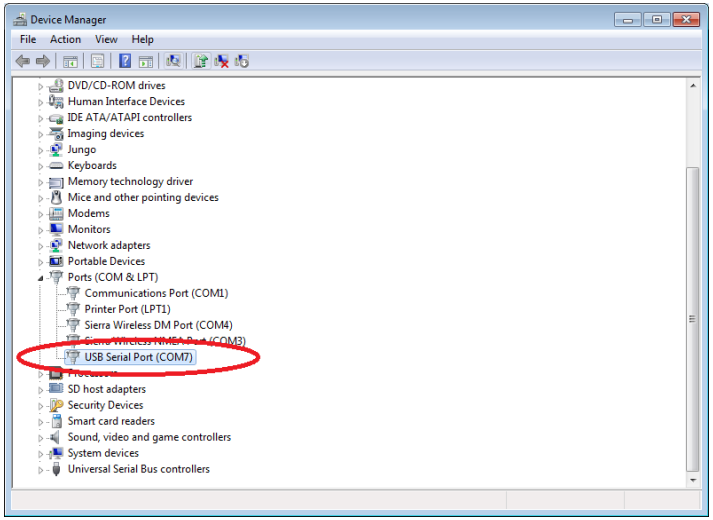
- Please check our dedicated microcontroller website:

www.spansion.com

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

Installation of the USB-driver

- Install the USB driver from the DVD with administrator priviliges
- 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
  - USB Serial Port (e.g.: COM7)



- Ready!

Tools and Software Examples

- Serial Port Viewer
  - Free of charge terminal program, Start installation
- USB Wizard
  - Free of charge USB configuration tool, Start installation
- Following examples are provided with SK-FM3-100PMC-MB9BF516N for IAR Embedded Workbench V6 and KEIL µVision4:
  - mb9bf51xn_template ‚Empty' project as base for user applications
  - mb9bf51xn_adc_dvm Digital Voltage Meter based on the A/D-converter
  - mb9bf51xn_can_uart_terminal Simple CAN example (CAN0)
  - mb9bf51xn_ioport_counter Counts from 0 to 99 on the 7-segment Display
  - Further examples on DVD and on our website

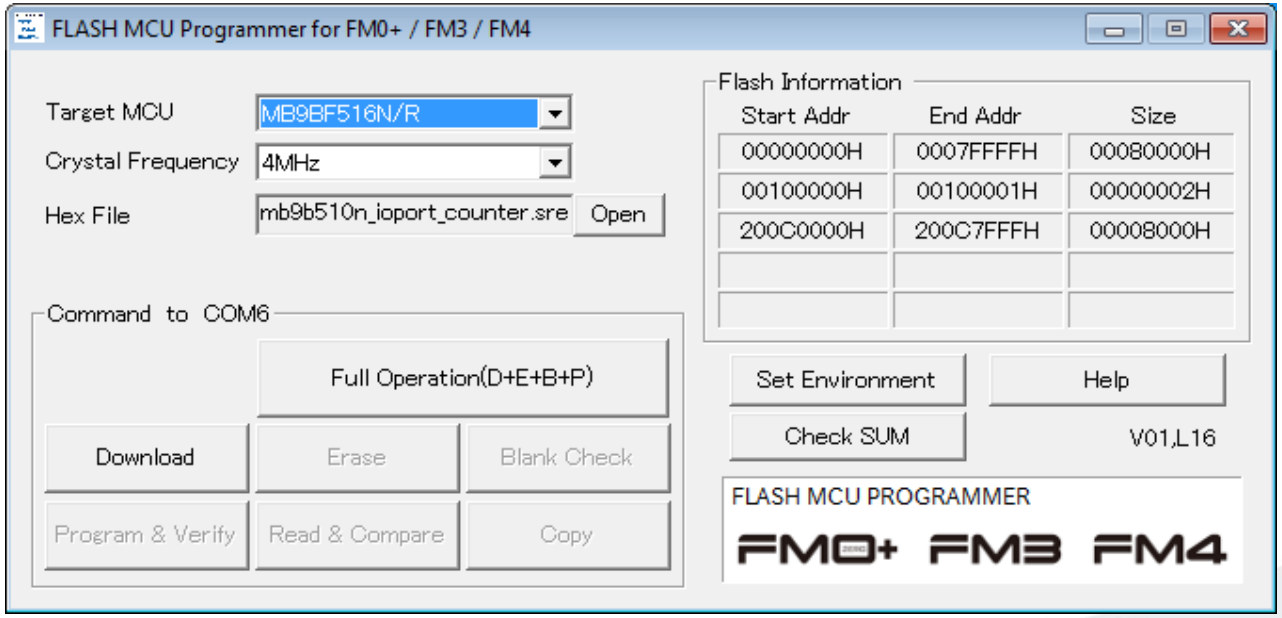
Note: **Please copy the examples to your local drive!**

Flash Programming

- There are two options to program the flash:
  - UART Programming (X4, X5)
    - Check jumper JP16 is opened
    - Connect UART0 of the board to the USB-Port of the PC
      - via USB (JP4,JP5: U-0, R-4)
      - via RS232 (JP4,JP5: U-4, R-0)
    - Use the FLASH MCU Programmer
  - USB Programming (X3)
    - Check jumper JP16 is closed
    - Connect the board via USB-Device (X3) to the USB-Port of the PC
    - Use the FLASH USB DIRECT Programmer

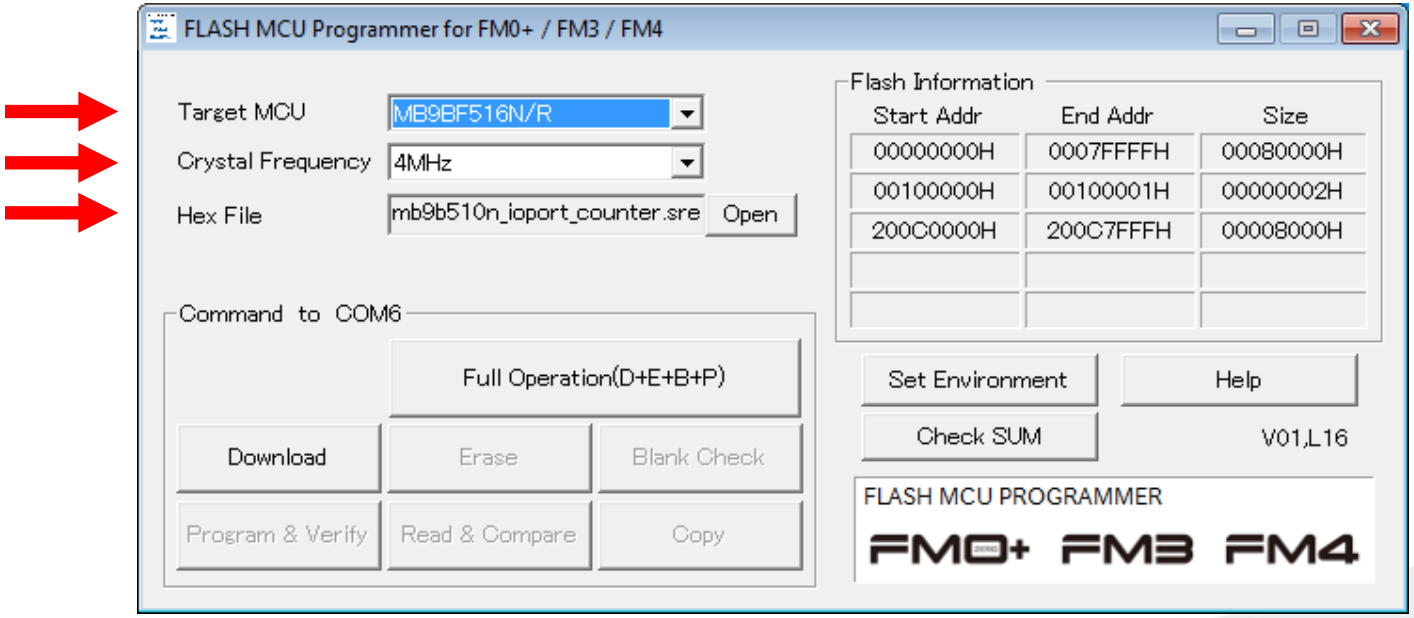
FLASH MCU Programmer for UART Programming

- FLASH MCU Programmer
  - Free of charge, no registration required
  - Windows based programming tool for FM3 microcontroller
  - Uses PC serial port COMx (incl. virtual COM port: USB-to-RS232)
  - Start installation



Program Download

- Start the FLASH MCU Programmer
- Select the target microcontroller (MB9BF516[N/R])
- Select the crystal frequency (4 MHz)
- Choose the software example from the example ‘exe‘-folder
  (e.g. Examples\mb9bfxxx_ioport_counter-v11\example\IAR\output\release\exe\mb9bfxxx_ioport_counter.srec)

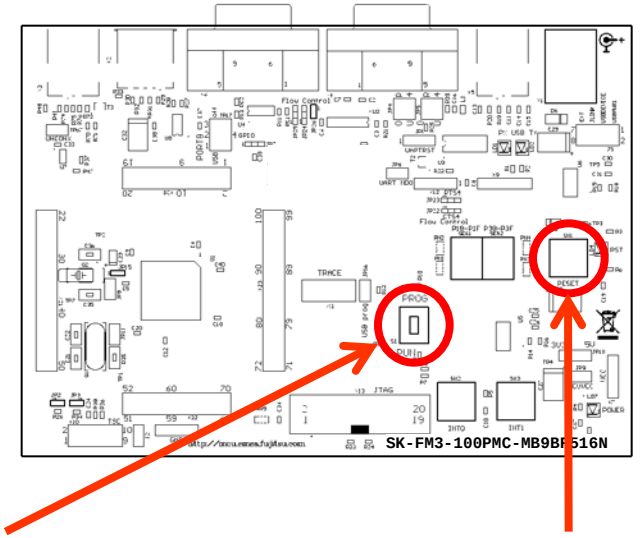


Program Download

- Connect to the PC
  - Connect UART0 with RS232 (X4) or with the USB interface X5
  - Select COM port (‚Set Environment‘)
- Open JP16
- Set switch S1 to position ‚PROG‘
- Press ‚Reset‘
- Start ‚Full Operation‘

(see JP4, JP5 jumper settings)

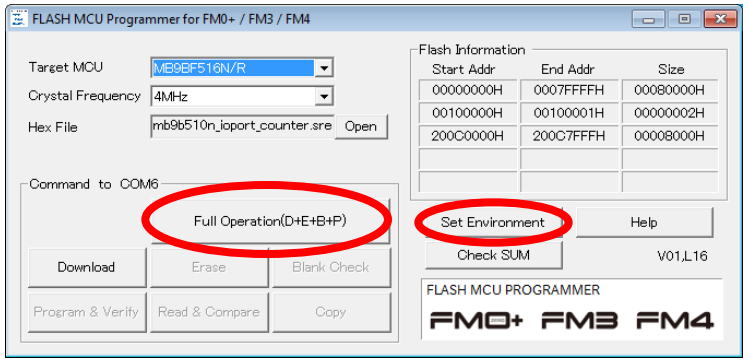
RS232 USB port

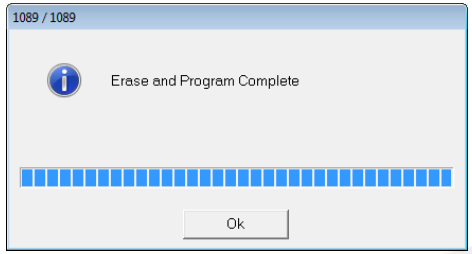


S1: Mode selection

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

Keybutton ‚RESET‘



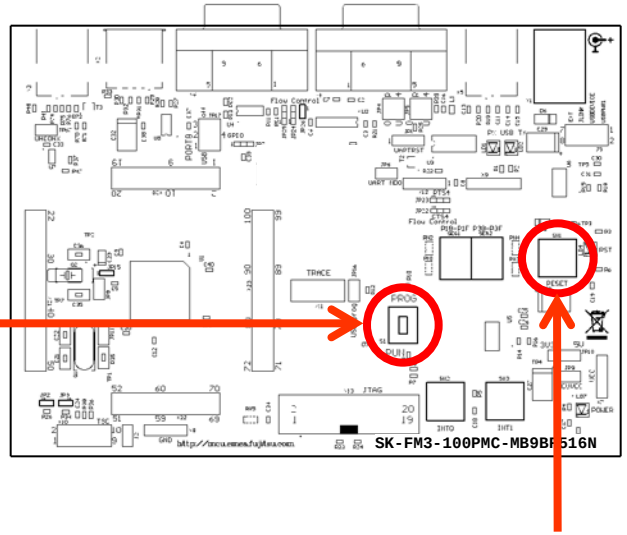


Program Download

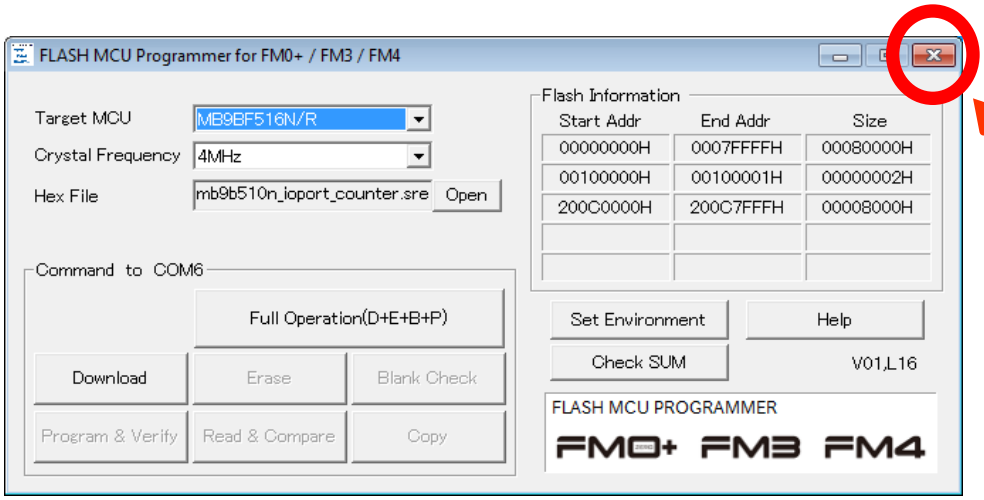
- Close the FLASH MCU Programmer
- Set switch S1 to position ‚RUN‘
- Press ‚Reset‘

S1: Mode selection

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



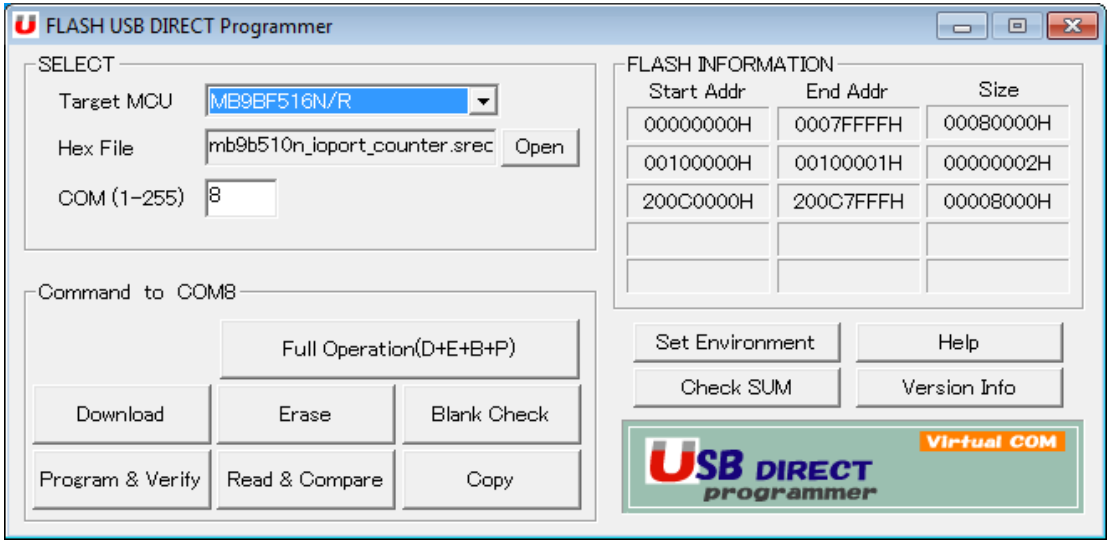
Keybutton ‚RESET‘



Close the FLASH MCU Programmer

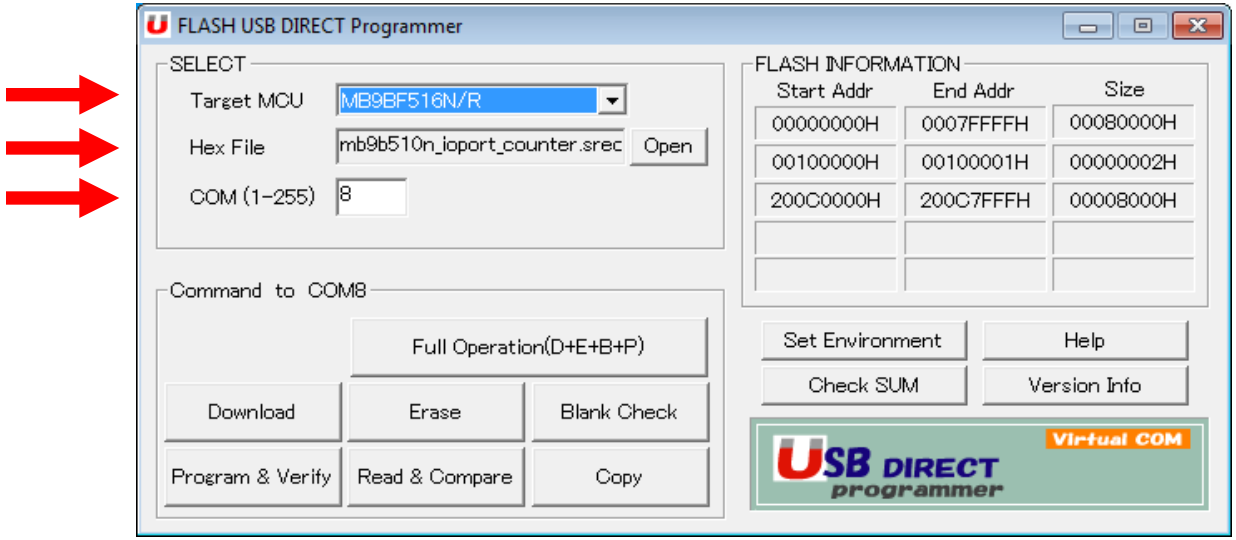
FLASH USB DIRECT Programmer for USB Direct Programming

- FLASH USB DIRECT Programmer
  - Windows based programming tool for FM3 microcontroller
  - Uses direct USB connection (via X3)
  - Start installation



Program Download

- Start the FLASH USB DIRECT Programmer
- Select the target microcontroller (MB9BF516)
- Choose the software example from the example ‘exe‘-folder **(e.g. Examples\mb9bfxxx_ioport_counter-v10\example\IAR\output\release\exe\ mb9bfxxx_ioport_counter.srec)**
- Select the COM port

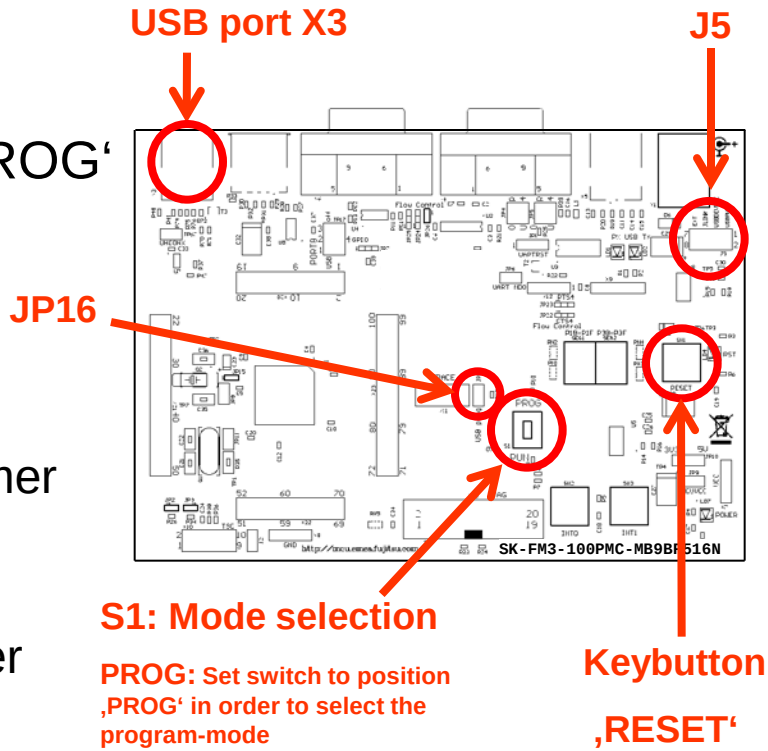


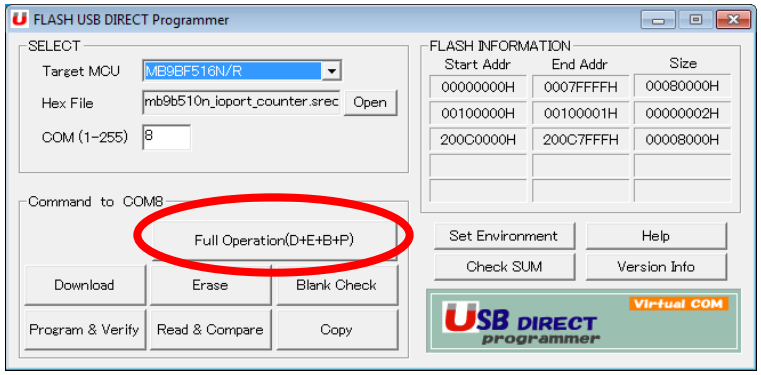
Program Download

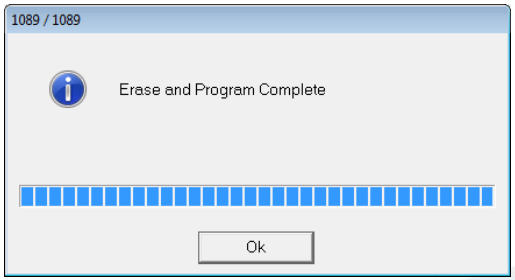
- Select the MCU power supply (J5)
- Close JP16, Set switch S1 to position ‘PROG‘
- Connect USB port X3 with the PC
- Install the USB driver
  - See subfolder ‘driver‘ of installed programmer
  - E.g.: C:\Program Files (x86)\Spansion\..

    ..FLASH USB DIRECT Programmer\driver

Press ‘Reset‘ and Start ‘Full Operation‘

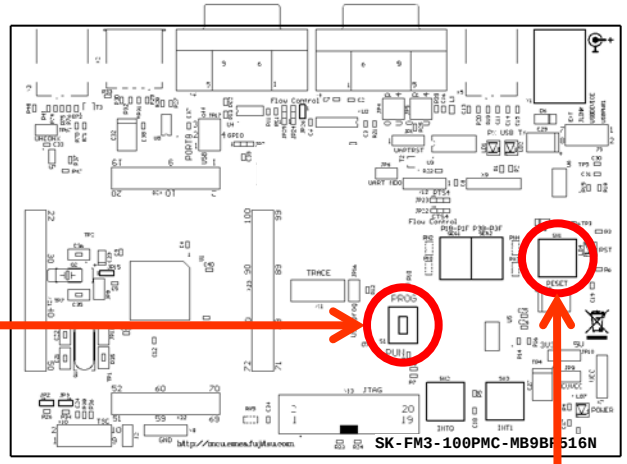






Program Download

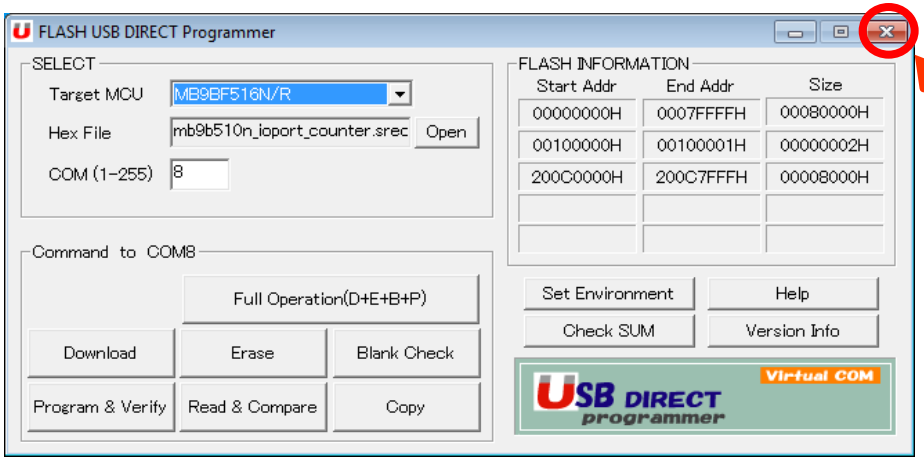
- Close the FLASH USB DIRECT Programmer
- Set switch S1 to position ‚RUN‘
- Press ‚Reset‘



S1: Mode selection

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

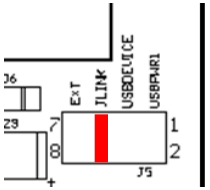
Keybutton ‚RESET‘



Close the FLASH USB DIRECT Programmer

Debugging via JTAG

- The MB9BF516N microcontroller offers a JTAG-Interface that is supported by SK-FM3-100PMC-MB9BF516N.
  - 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 X13 and to the USB-Port of your PC
  - Use IAR-Embedded Workbench to debug your program
  - If the JTAG-Adaper allows powering the target, then jumper J5 can be set as follows:

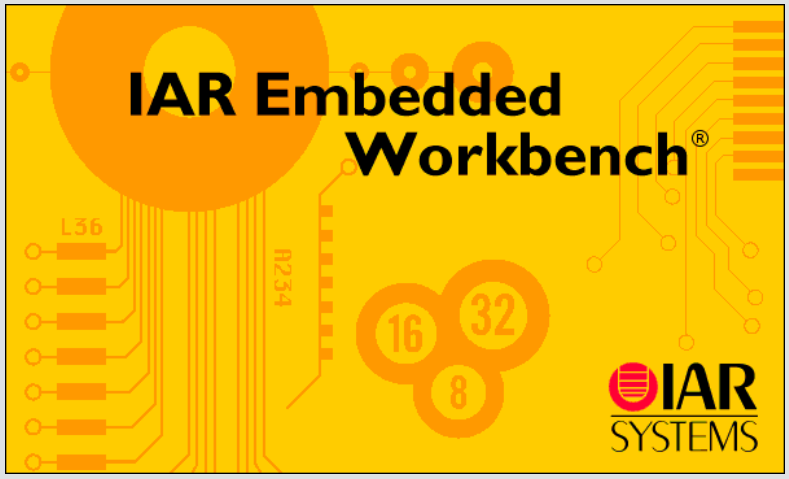


Debugging via TRACE

- The MB9BF516N microcontroller offers an ETM (Embedded-Trace-Macrocell) that is supported by SK-FM3-100PMC-MB9BF516N
  - An optional JTAG-Adapter supporting trace features is required e.g. ULINKpro from KEIL
  - The ETM is connected to the 20-Pin-Header X11 (TRACE)
  - Use e.g. KEIL µVision to trace your program

IAR Embedded Workbench

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

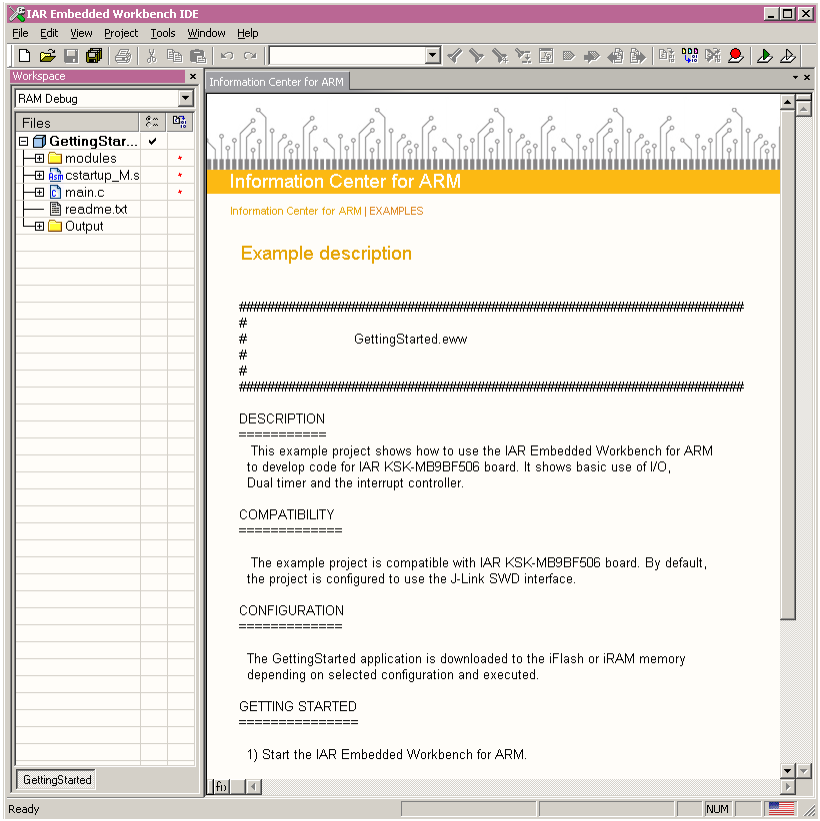


IAR Workbench Getting Started

- Install EWARM from IAR-CD or download latest version from IAR Website
  - EWARM size-limited (32k) or time-limited (full) Evaluation Version
    - http://supp.iar.com/Download/SW/?item=EWARM-EVAL
- Start EWARM Workbench
- Choose File → Open → Workspace
  - e.g.: <drive:>\<board>\Examples\mb9b510n_ioport_counter_v11\example\IAR\
  - Choose mb9b510n_ioport_counter.eww

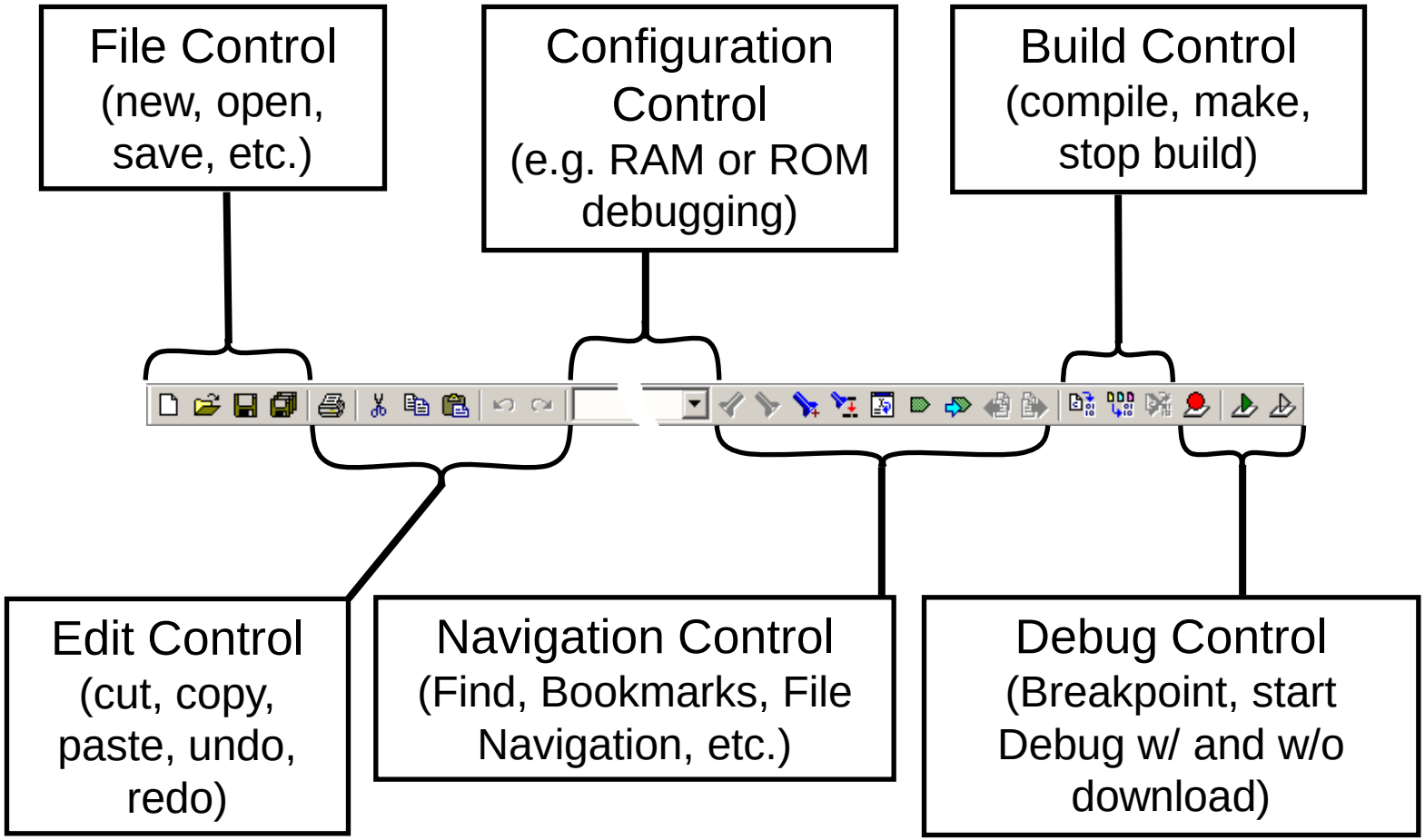
IAR Workbench – Main Window

- IAR Workbench
  - Workspace on left side of Workbench window
    - If hidden then View→Workspace
  - Source files on right side of Workbench window as tabbed windows
  - Project open
    File → Open → Workspace → *.eww
  - For new projects
    start with ‚mb9bf56xr_template'



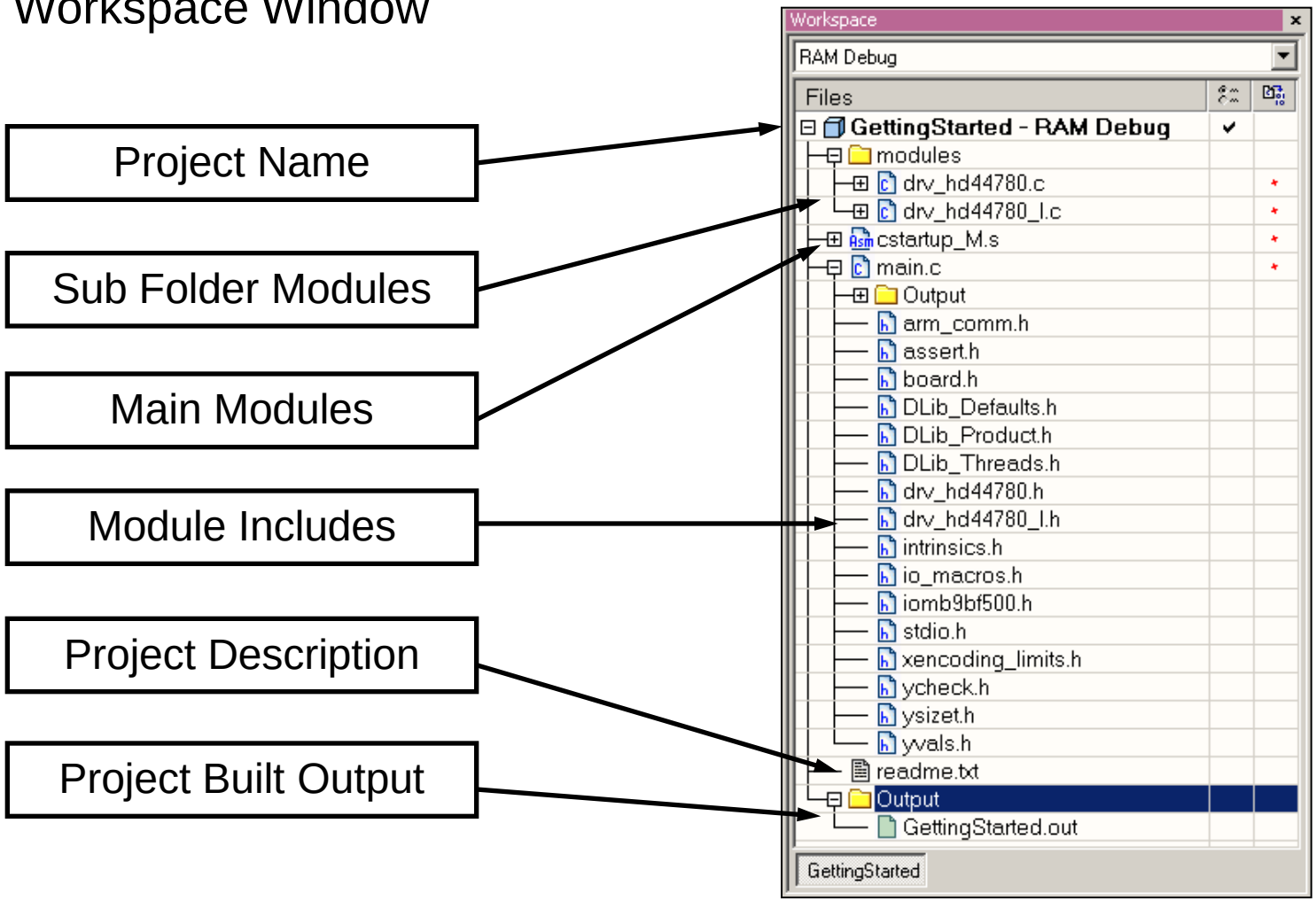
IAR Workbench – Menu Bar

- IAR Menu Bar



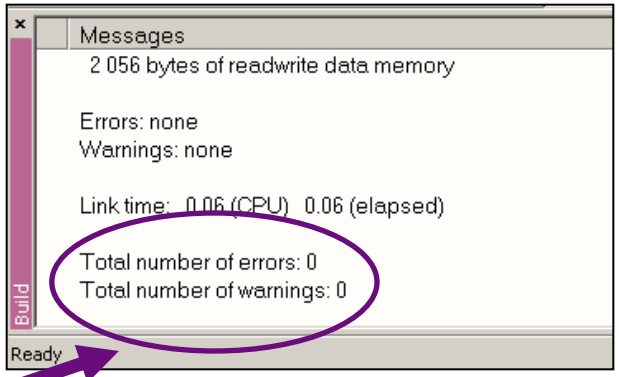
IAR Workbench – Workspace

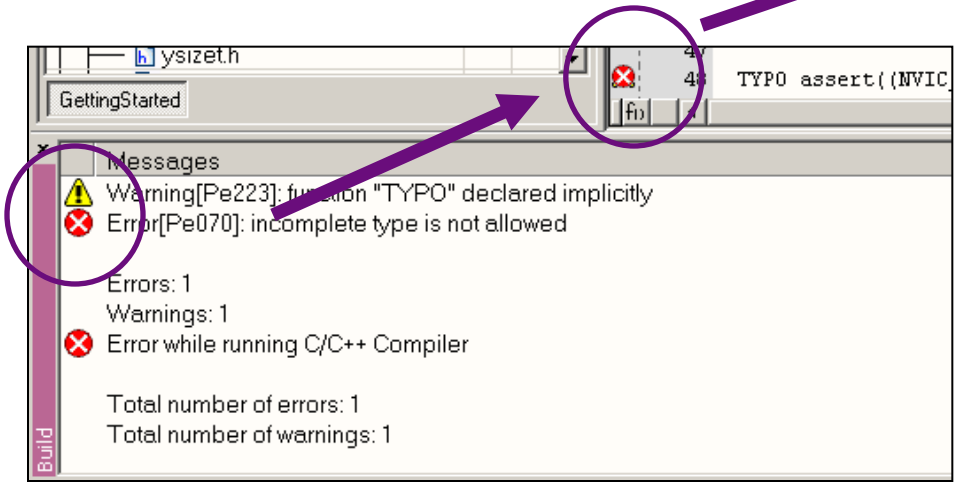
- IAR Workspace Window



IAR Workbench – Making Project

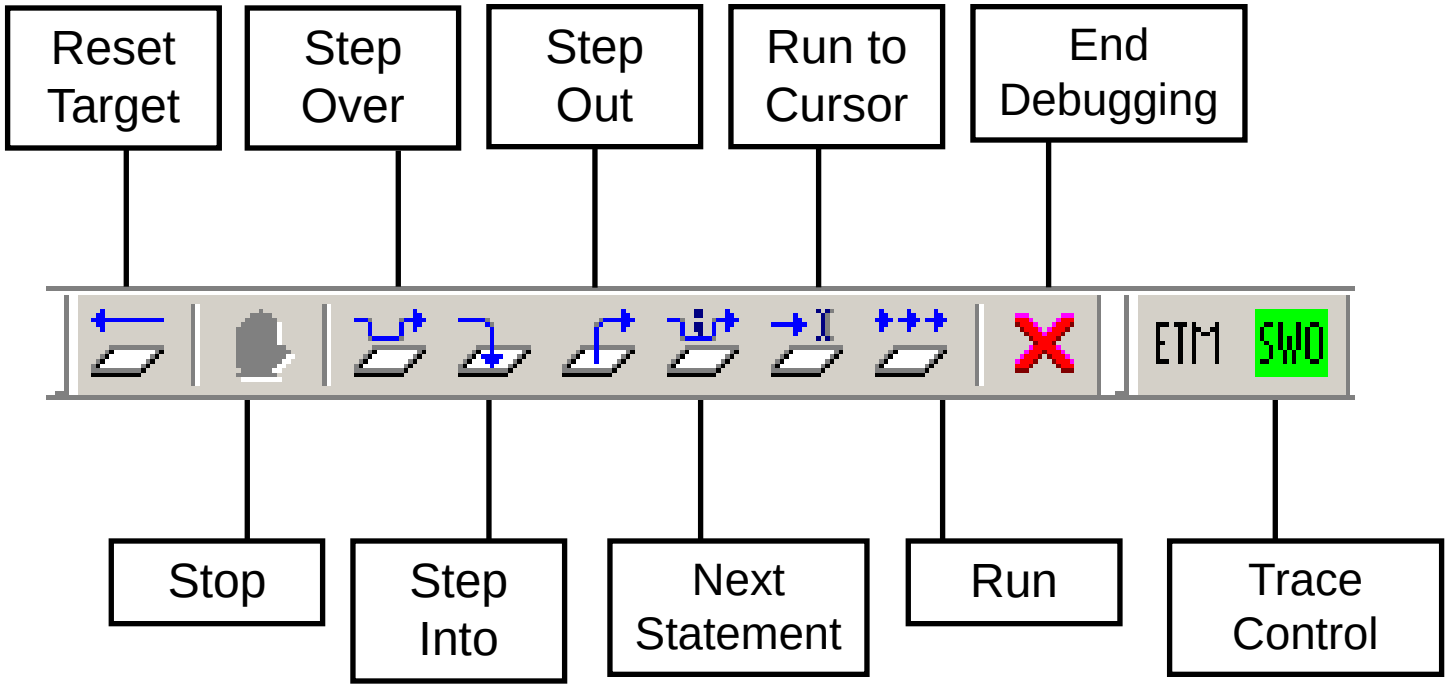
- Making the Project
  - Use Make-Icon ( ), <F7> or Menu: Project→Make
  - Check for no errors in Output window below
  - Build errors are indicated by ⚠ or ⛔ In Output window and Source view





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

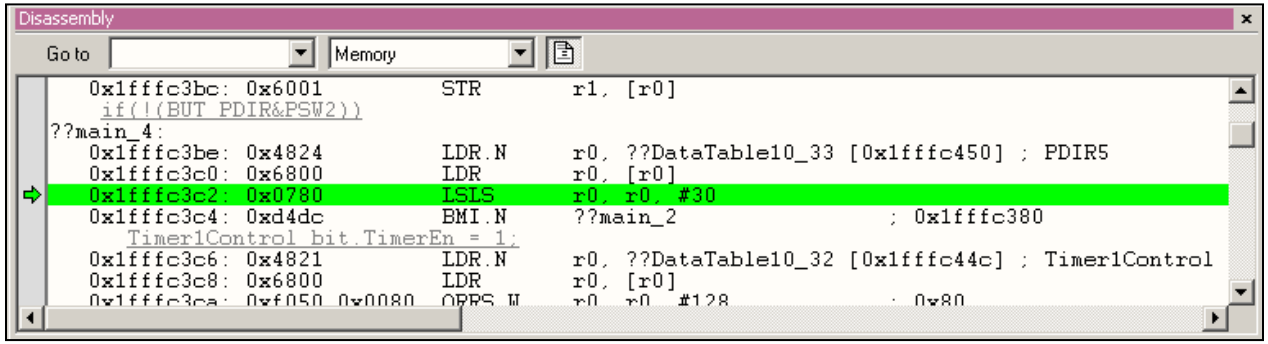


IAR Workbench – Debug (1)

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

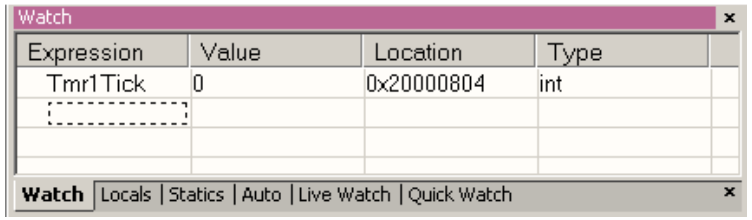
```
165   CSW_TMR_bit.MOWT = 9;
172   PSW_TMR_bit.POWT = 2;
148   Timer1IntClr = 1;
```

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

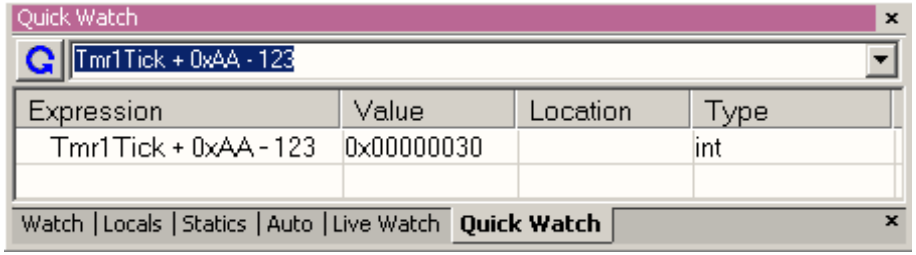


IAR Workbench – Debug (2)

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



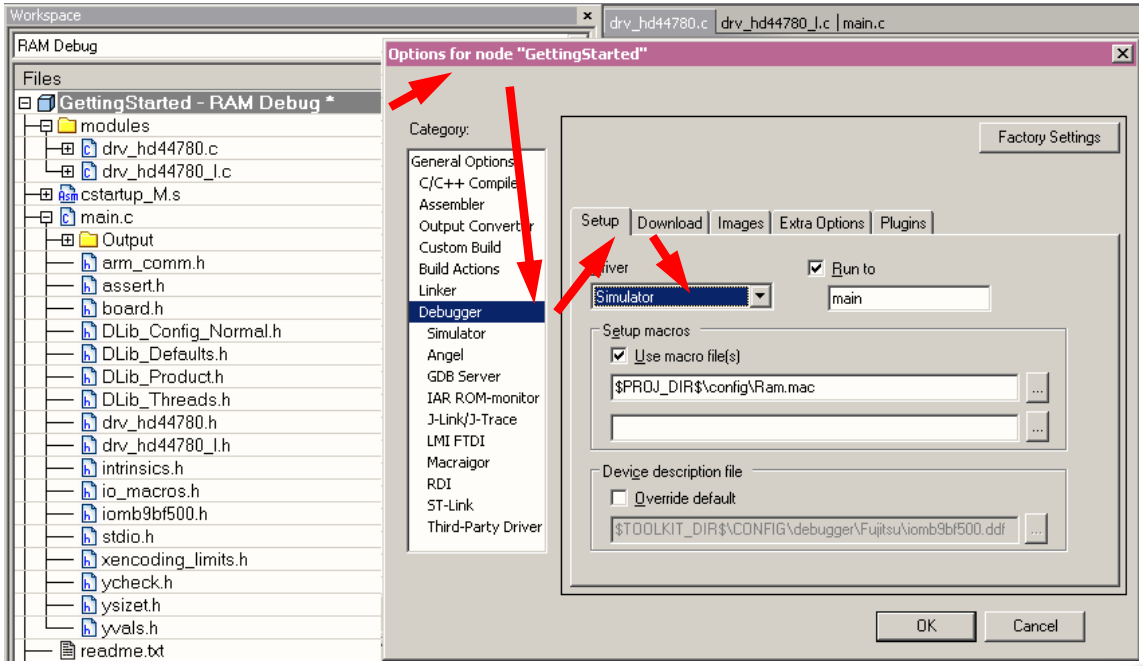
  - Quick Watch
    - The Quick watch allows the user to calculate and recalculate expressions even with variables



    - 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

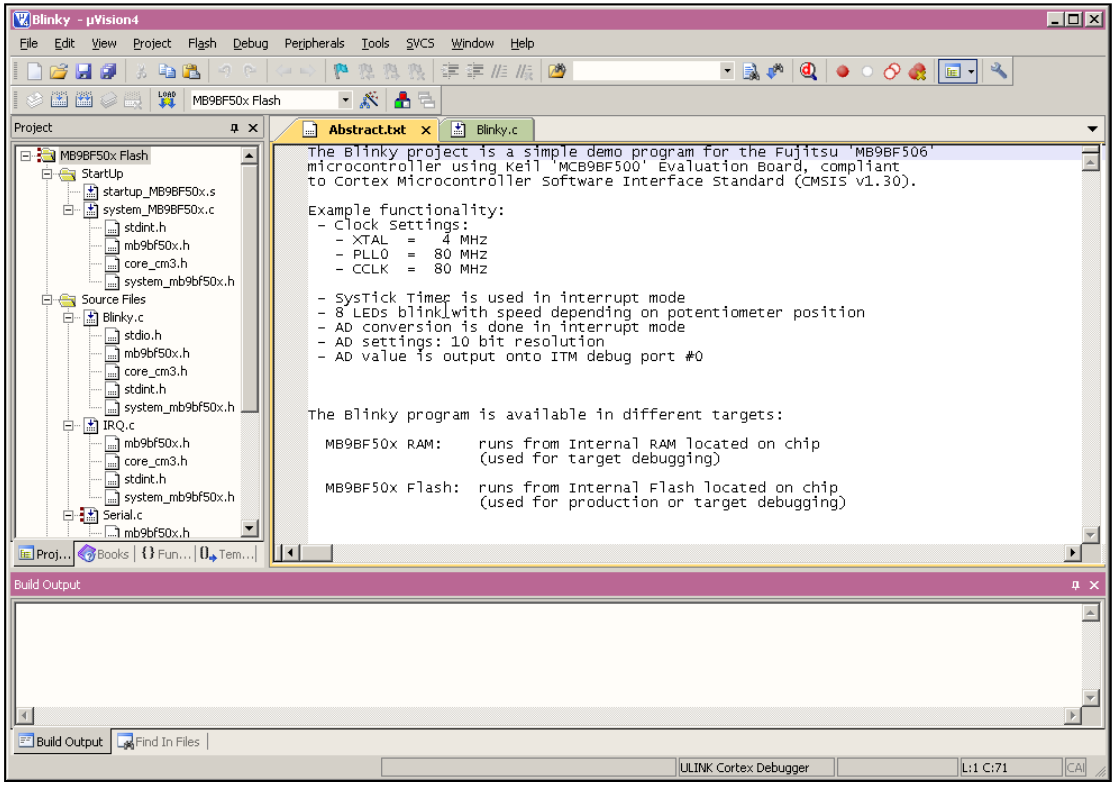
- Installation
- Getting Started
- Open Project
- Build Project
- Debug Project

KEIL µVision IDE and Debugger Getting Started

- Install µVision from KEIL-CD or download latest version from KEIL Website
  - Evaluation Version
    - https://www.keil.com/demo/eval/arm.htm
    - Registration required
- Install ULINK-ME
  - Special installation is not needed, because ULINK-ME acts as a USB Human Interface Device (HID) and thus needs no extra USB driver
- Install ULINK Pro (optional)
  - ULINK Pro needs an own dedicated USB driver located in: <Installation Path>\KEIL\ARM\ULINK
- Start µVision

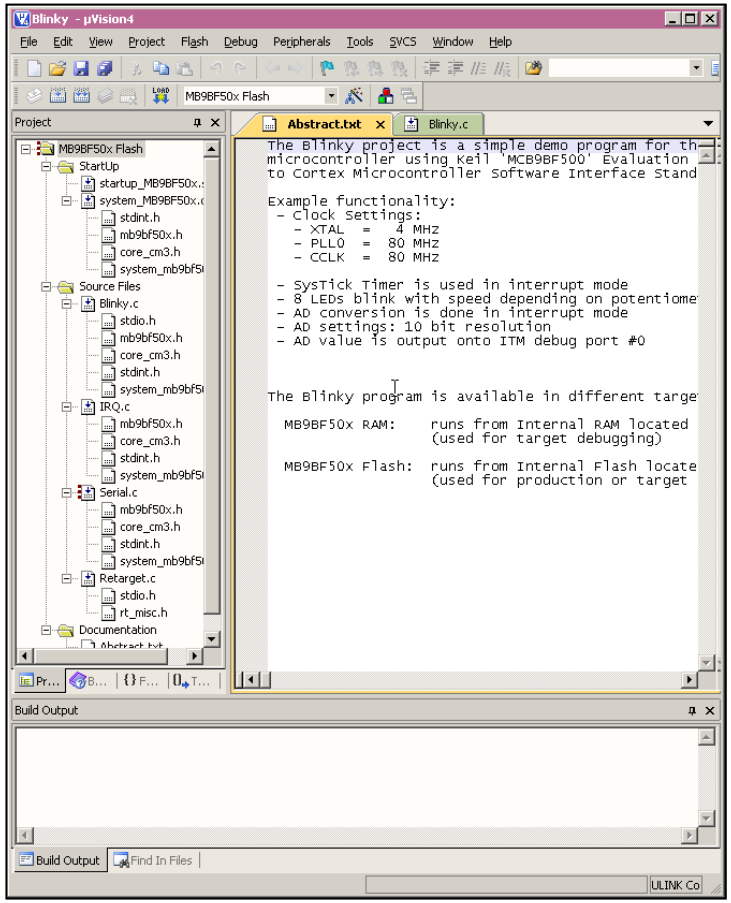
KEIL µVision – Getting Started

- Choose Menu: Project→Open Project...
  - Browse to: <drive:>\<board>\Examples\mb9b510n_adc_dvm-v11\example\ARM\
  - Choose mb9b510n_adc_dvm.uvproj



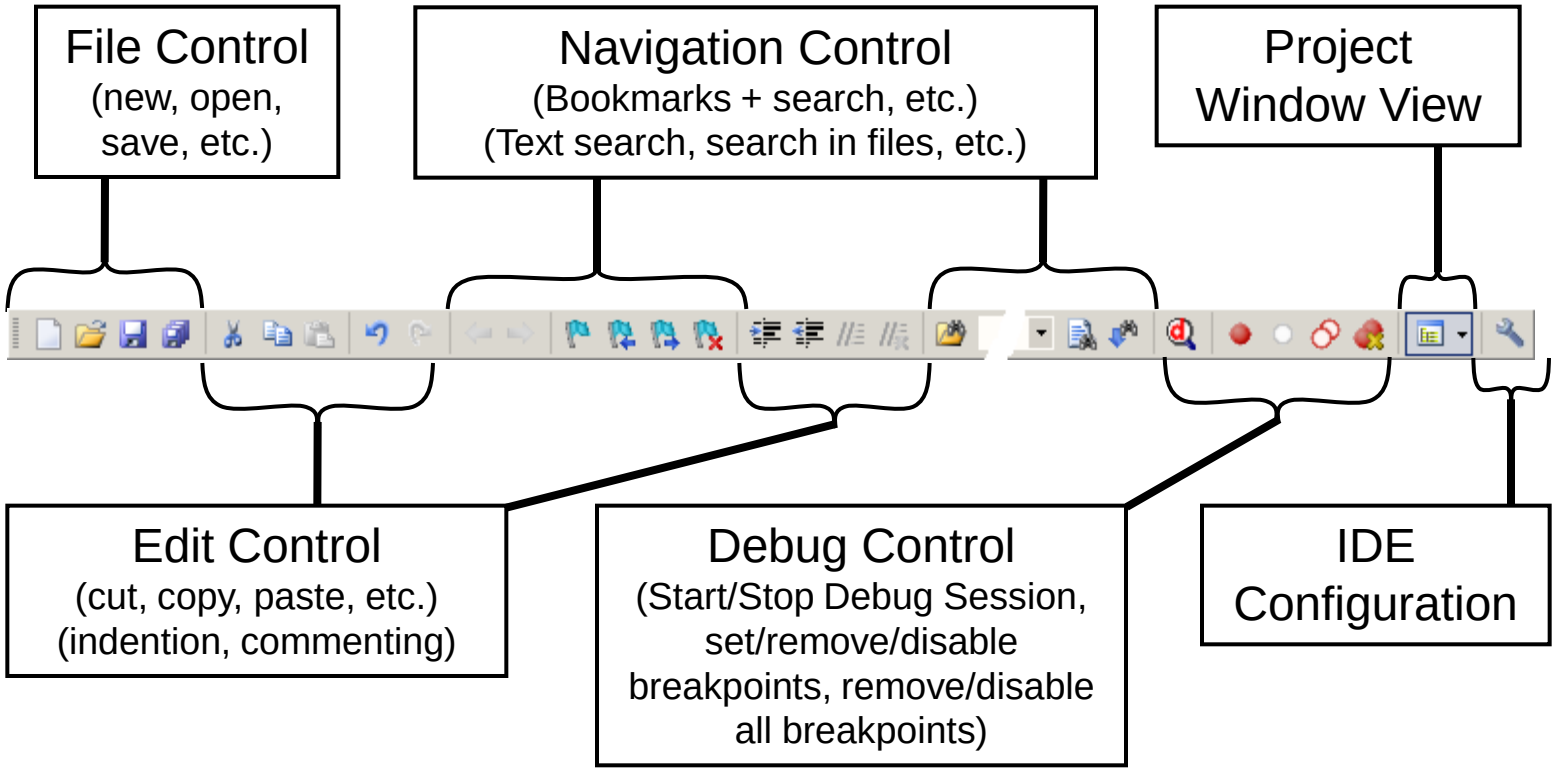
KEIL µVision – Main Window

- 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



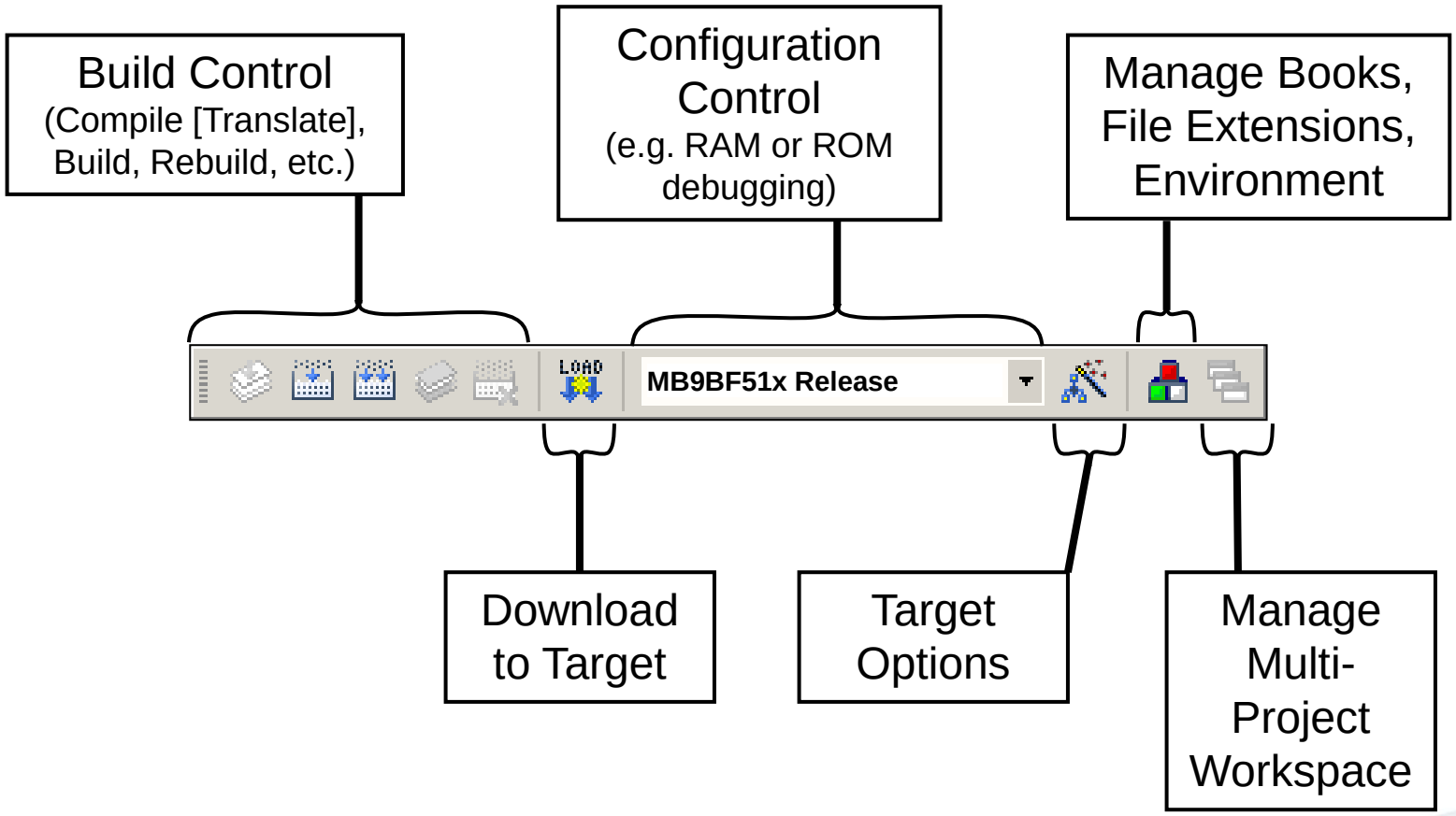
KEIL µVision – Menu Bars (1)

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



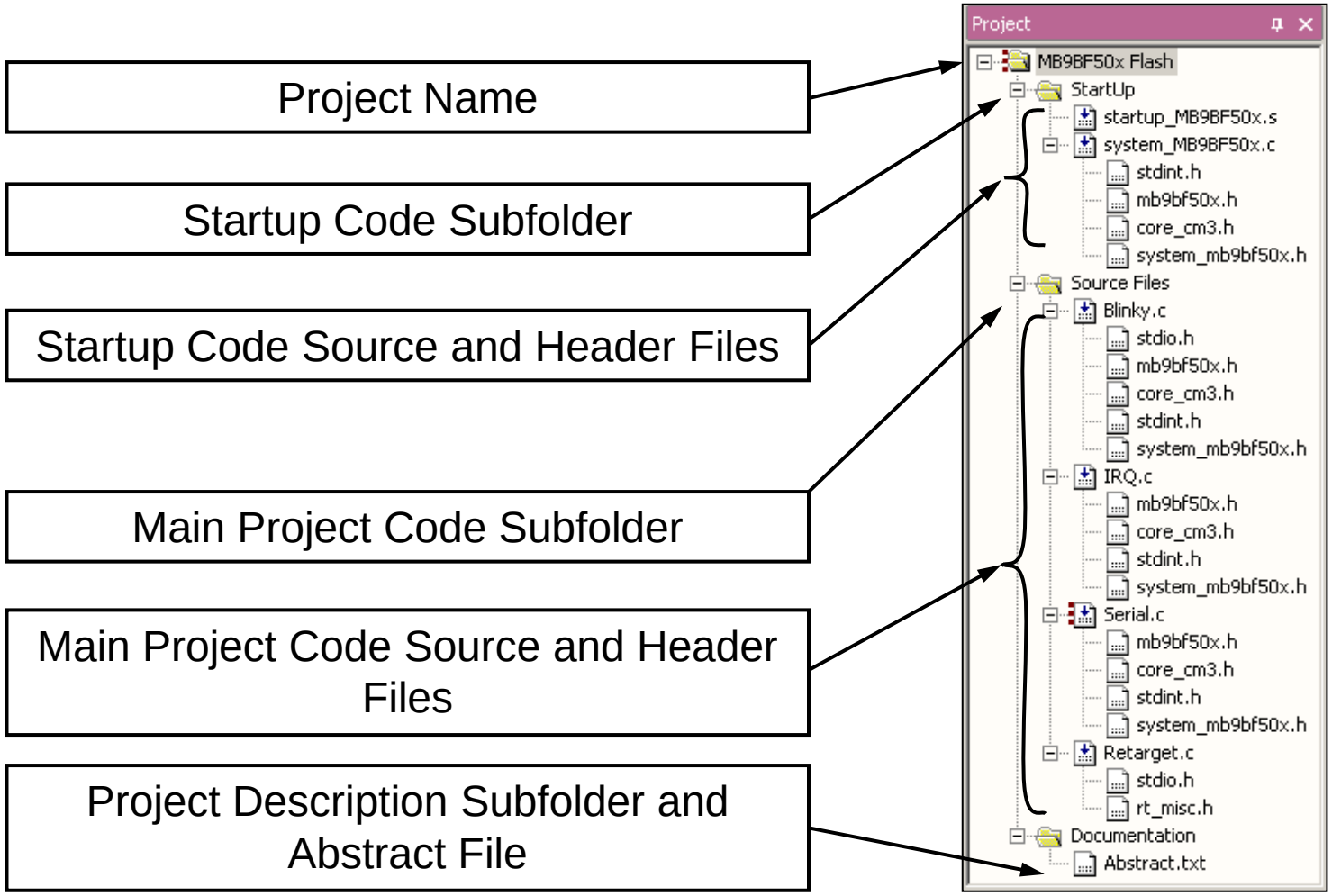
KEIL µVision – Menu Bars (2)

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



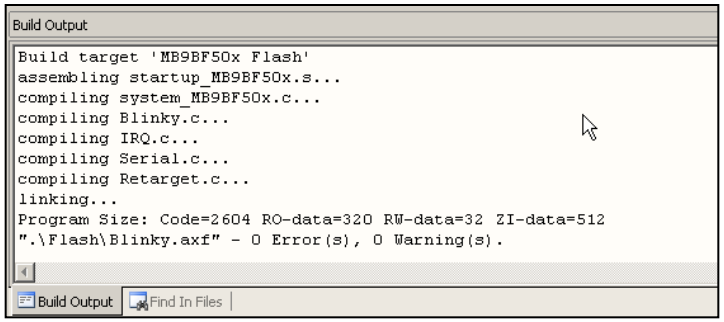
KEIL µVision – Project Window

- µVision Project Window

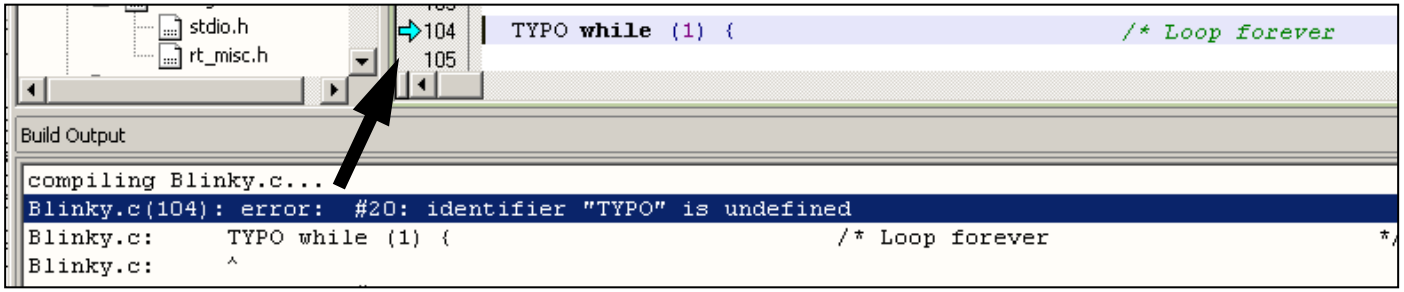


KEIL µVision – Making Project

- 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



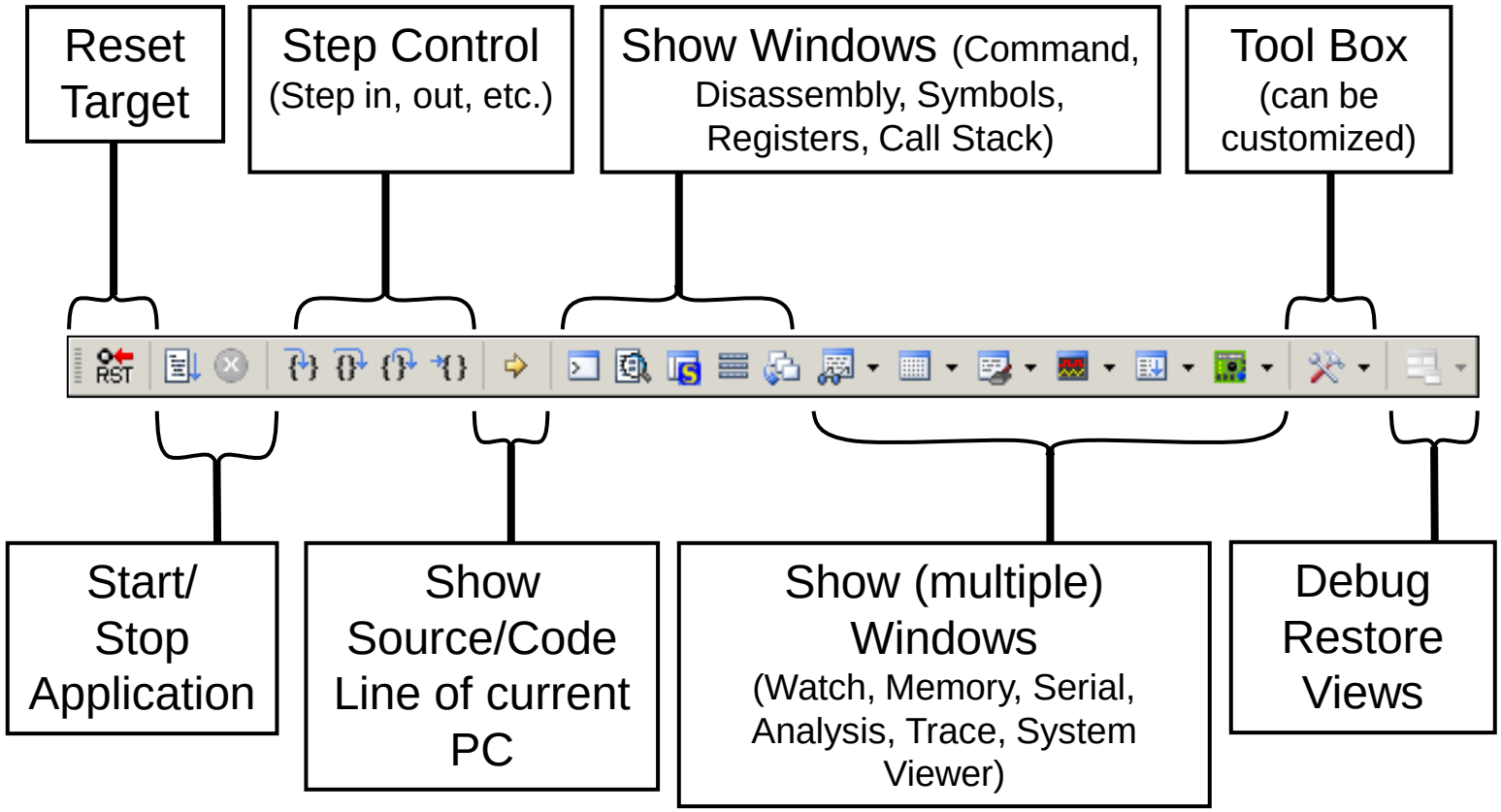
KEIL µVision – Debug (1)

- 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

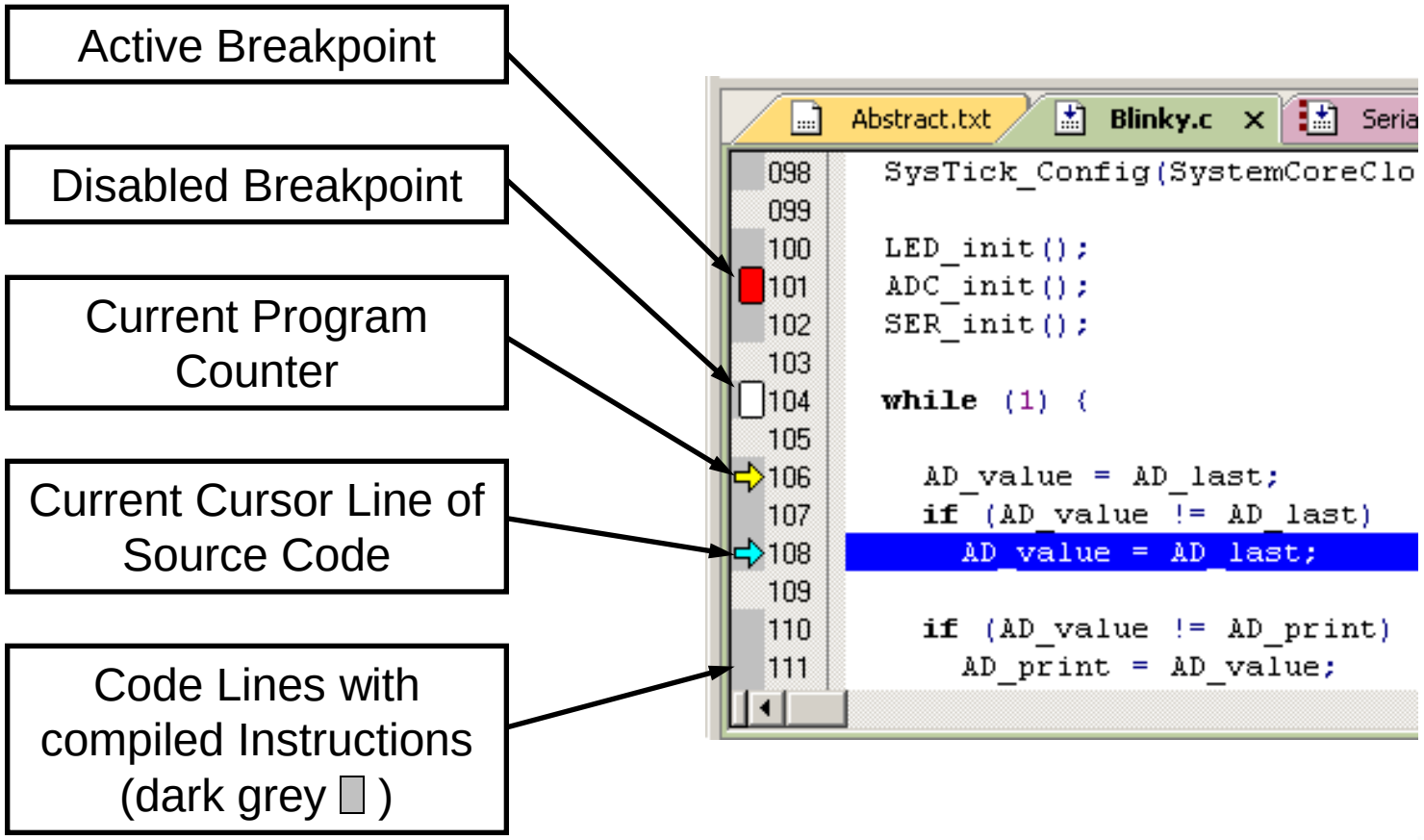
KEIL µVision – Debug (2)

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



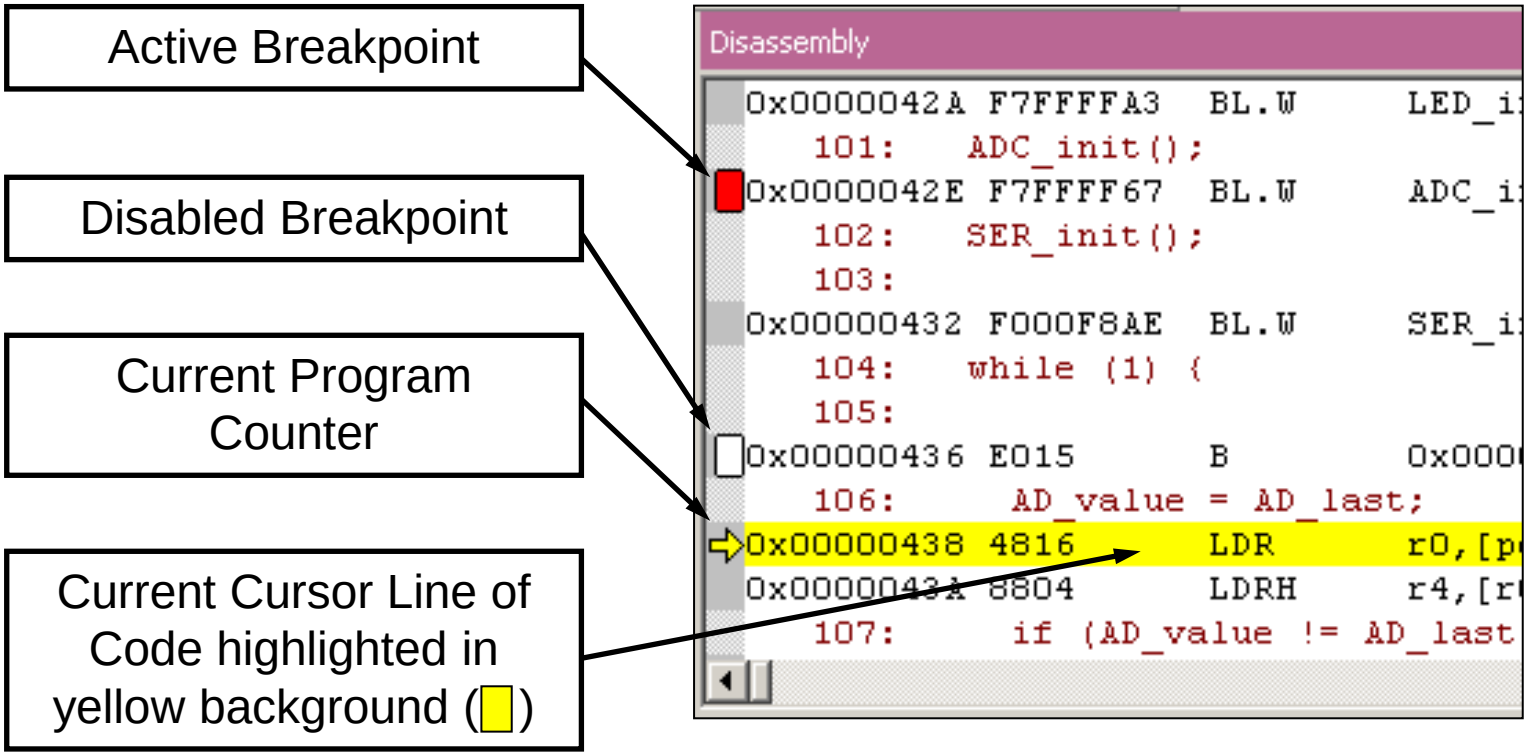
KEIL µVision – Debug (3)

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



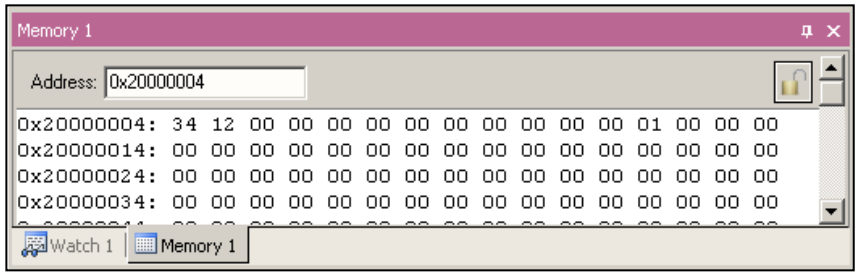
KEIL µVision – Debug (4)

- Disassembly View
  - Mixed mode is selectable and deselectable

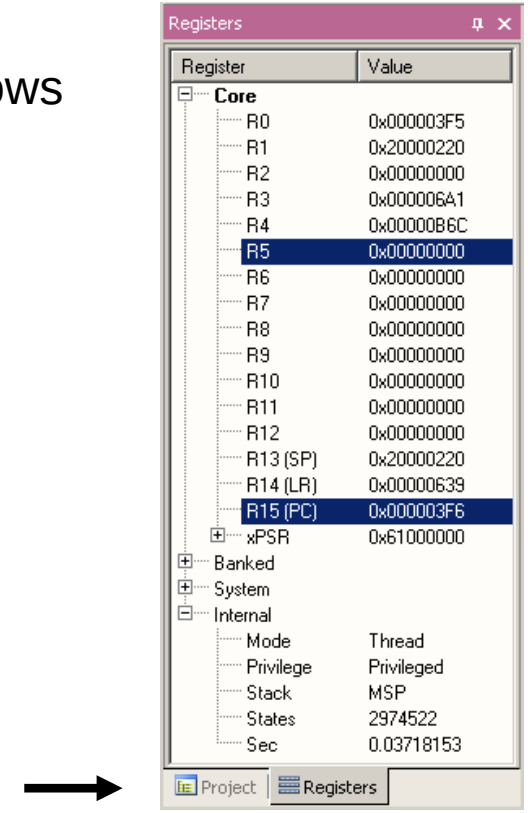


KEIL µVision – Debug (5)

- 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

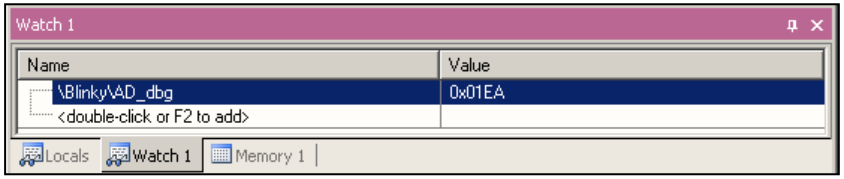


- Register View
  - Register view is a tab of the Project window
  - Changes are highlighted in dark blue text background
  - Register tree knots can be expanded

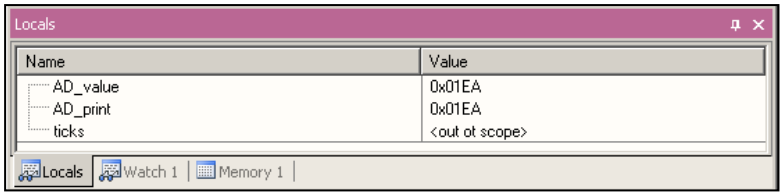


KEIL µVision – Debug (6)

- Variable Windows
  - Watch Windows



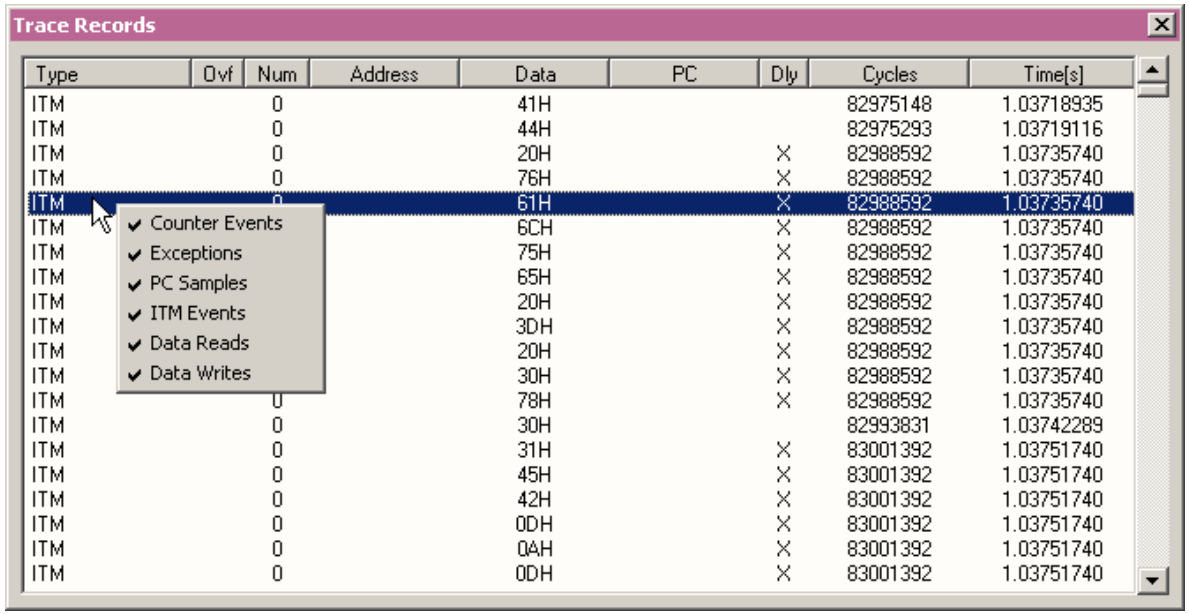
    - Up to 2 Watch windows are sharing their tabs with e.g. Memory and Local views
    - Updated during runtime
    - Any changes are highlighted in dark blue text backround color
    - Displayed values can be changed by user during break
  - Local View



    - 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

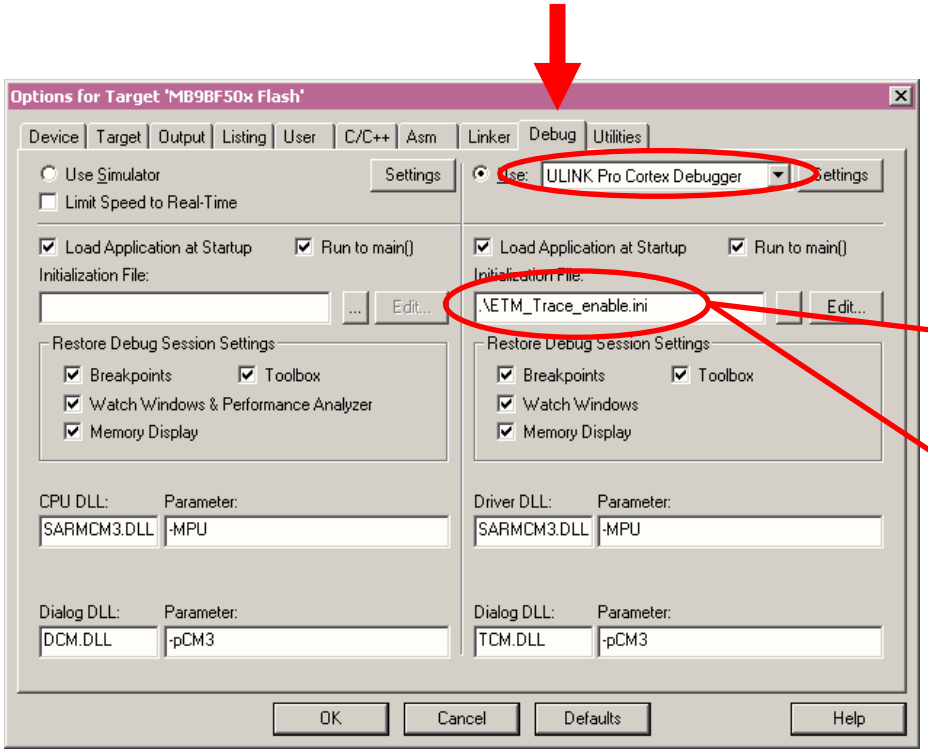
KEIL µVision – Trace (ULINK ME)

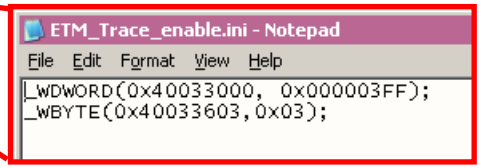
- Trace via ITM
  - Simple Trace views via Instrumentation Trace Macro is supported by µLINK ME
    - Records
    - Exceptions
    - Counters



KEIL µVision – Trace (ULINK Pro) (1)

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

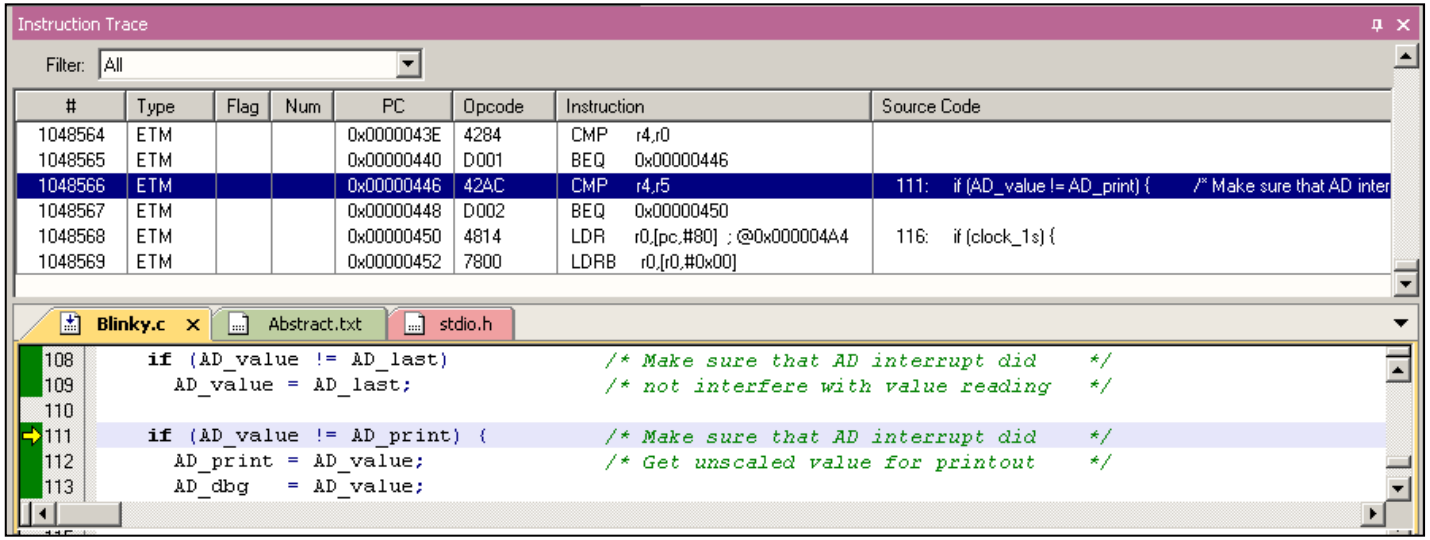




enables ETM pins

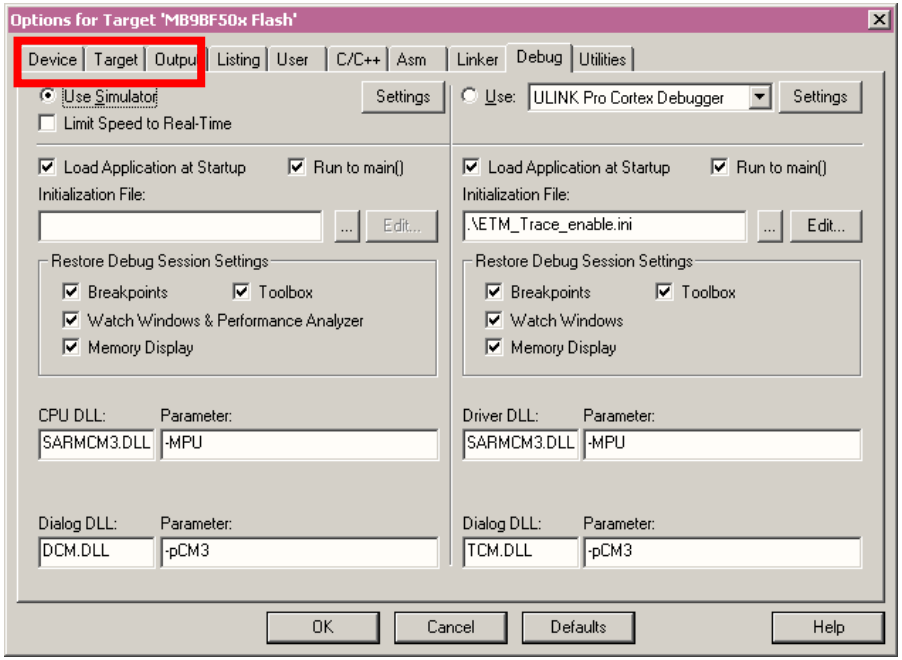
KEIL µVision – Trace (ULINK Pro) (2)

- 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...] → [Debug] and then choosing [Use Simulator]
  - Look & feel is like using ULINK debugger
  - Controlable also with *.ini files



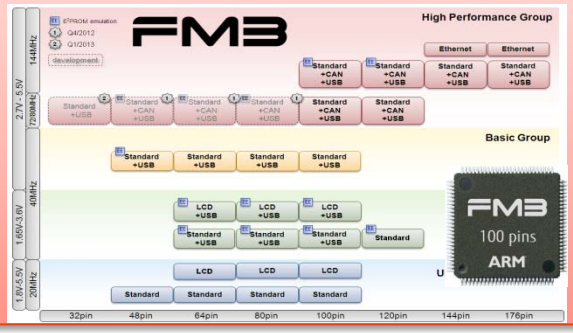
Solutions

Solutions

FM Family
ARM®Cortex™-M industrial platform
the smarter choice

FM3 library
FM3 connect
FM3 touch
FM3 inverter
FM3 safety
.....

Products



Eco system

SPANSION

FM3 library

- FM3 Low Level Library (L3)
  - CMSIS compliant header files
  - Driver collection to supports MCU peripherals
  - Hardware abstraction layer offers an API
  - Interrupt handling supported
  - Optimized memory use
    - For unused resources, no memory for library code is allocated

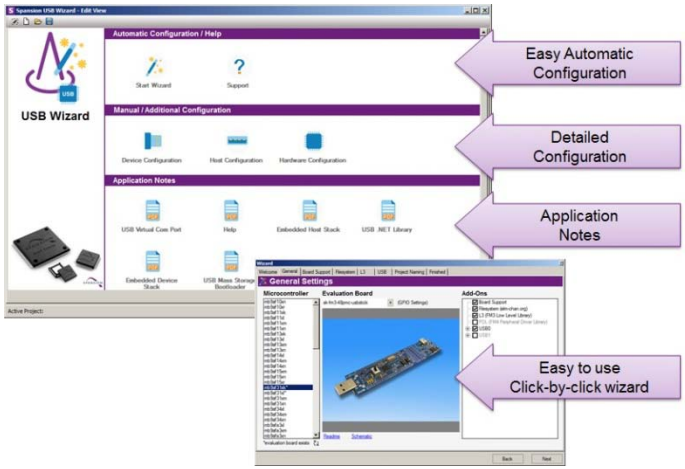
- Supported Modules
  - ADC (A/D-Converter), BT (Base Timer), CAN, CRC, CLK , CRTRIM (CR Clock Trimming), CSV (Clock Supervisor) , DAC (D/A-Converter), DMA, DSM (Deep Standby Modes), DT (Dual Timer), EXINT (External Interrupts), EXTIF (External Bus Interface), FLASH, GPIO, LVD (Low Voltage Detection), MFS (Multi Function Serial: UART, SPI, I2C, LIN), MFT (Multi Function Timer), QPRC (Quadrature Encoding), RESET (Reset Cause), RTC (Real Time Clock), USB (Host and Device) , WC (Watch Counter), WDG (Watchdog: SW, HW), …, and more.

SPANSION

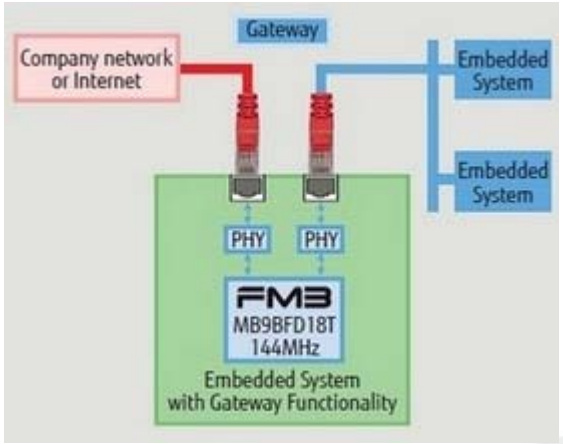
Solutions

FMconnect

- FMconnect USB
  - Up to two USB interfaces
    - Supports Host/Device/OTG
    - Control, interrupt, bulk, isochronous
  - Free software examples
  - Spansion USB Wizard (PC based GUI):
    - USB driver configuration
    - Easy creation of USB descriptors
    - Code injection in existing projects



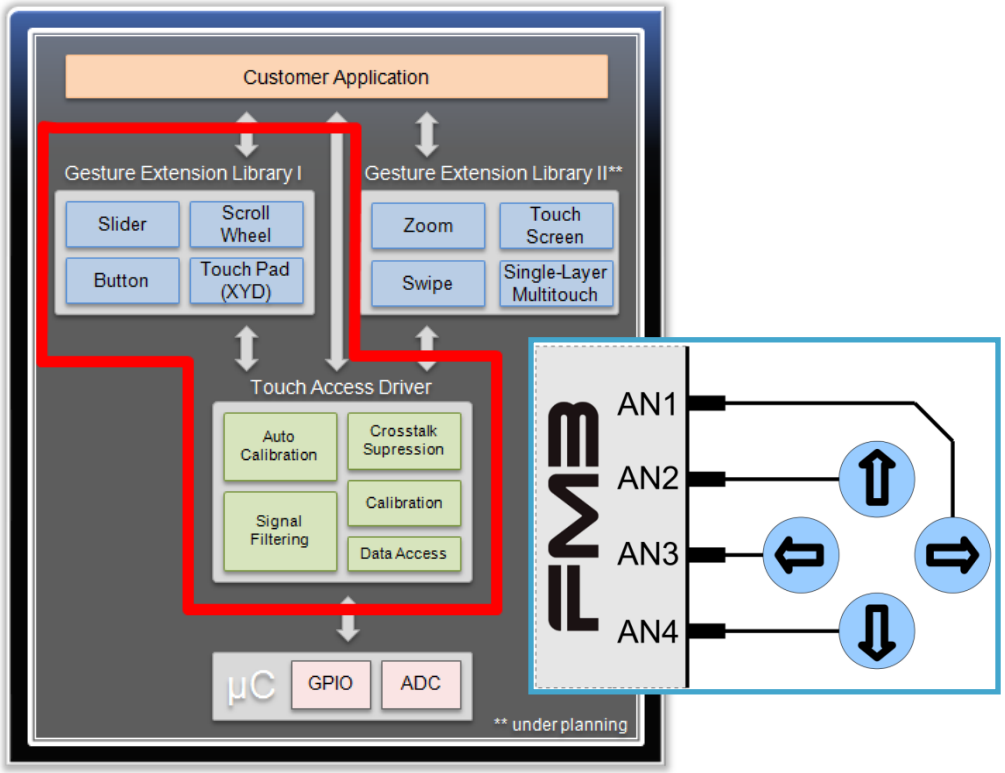
- FMconnect Ethernet
  - One or two channels Ethernet MAC
  - Dedicated Ethernet starter kit
  - Free Ethernet software:
    - Low level driver available
    - TCP/IP stack available
    - Software examples, e.g.: web server
  - Commercial products from partners



Solutions

FM3 touch

- Software FM3touch library
  - Works on all FM3 derivatives, user can freely choose best-fitting FM3 MCU and add touch functionality
  - No external components
  - Only one pin (ADC channel) per touch input
  - High sensitivity (<10fF)
  - Low ressource usage, no ‚atomic' handling required



  - Flexible configuration and event system for easy integration
  - Configuration tool included
  - Free of charge (basic variant)

Solutions

FM3 inverter

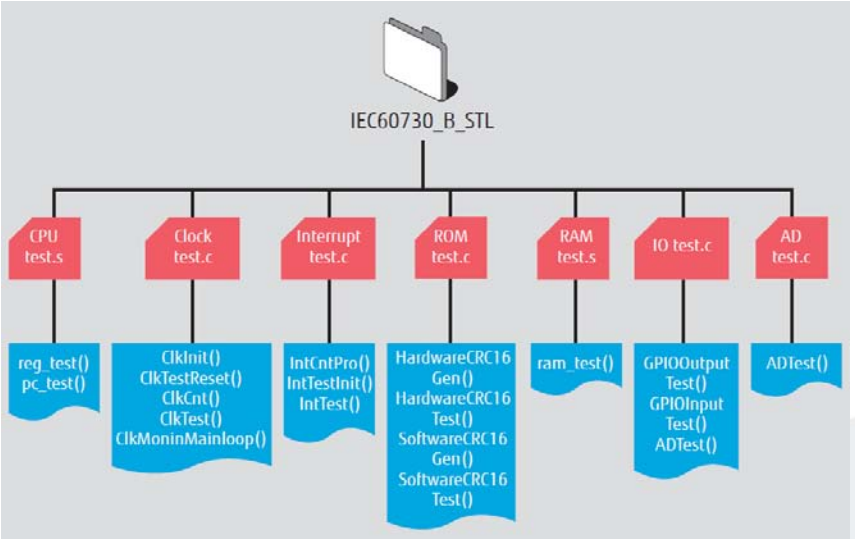
- FM3 inverter drive hardware features
  - Up to 3 ch flexible 3-phase motor timers, automatic dead time insertion
  - Up to 3 ch independent 12-bit 1Msps ADCs, up to 32 ADC inputs
  - Up to 3 ch ABZ quadrature decoder units
  - DTTI input for motor emergency stop
  - 3.3V and true 5V single supply guarantees robustness

- FM3 software motor control library
  - Support for BLDC, PMSM, IPM and ACIM
  - Field oriented control
  - Support for encoder or hall sensor feedback, or sensorless application

FM3 safety

- FM3 functional safety hardware features
  - Two stage watchdog with independent clock source
  - Clock supervisor (clock failure and abnormal frequency detection)
  - On-Chip Low Voltage Detector
  - CRC hardware module
  - MPU (Memory Protection Unit)
  - DTTI input for motor emergency stop

- IEC60730 Class B
  - Self-Test Library available
  - CPU test
  - Clock test
  - Interrupt test
  - Memory test
  - I/O test
  - A/D converter test



SPANSION

Finally

Workshops & Seminars

FM Seminar	Motor Control	USB Workshop	Ethernet Workshop
Please register here: http://news.spansion.com/seminars			
• Overview FM family • Memory • Peripheral resources • Packages • Processor architecture • Bus structure • Flash memory • Flash programming • Peripheral resources • Clock distribution • Timer • Interfaces • FM features • Development tool chains • IAR workbench / J-Link • KEIL µVision / uLink • Starter Kits • Practical exercises • Flash programming • Project setup/modification • Debugging • External interrupts	• Introduction of Spansion MCU • Line-Up of microcontrollers with motion control features • Performance • Introduction of motors types • ACIM • BLDC • PMSM • Introduction of control types • Sinusoidal commutation • Field Orientated Control • Space Vector Modulation • Peripherals of FM3/FM4 MCUs • Base Timer • Multifunction Timer • 12-bit A/D Converter • Quadrature Position and Revolution Counter • Interrupt Controller • Hands-on exercise / SW-Example • BLDC motor with hall sensor • PMSM motor with field orientated control	• Introduction of Spansion MCU • Line-op of USB MCUs • USB vs. RS232 • Historical Background • Electrical Layer • USB Protocol • Enumeration Process (Descriptors & USB Settings) • Transfer Types • Data Transfers • USB Class Concept • Software Driver Concepts • USB Host • USB Examples • Virtual COM Port • USB Descriptor Manager • Create Template Classes • Create Descriptors • PC software based on LibUSB • Special Use Cases • e.g. boot loader	• Introduction of Spansion MCU • Line-op of Ethernet MCUs • Fundamentals of Ethernet • Ethernet Microcontrollers • Hardware Design considerations • Software Design considerations • Communication layer models • The Internet Protocol suite • Web technologies in embedded systems • Developing Ethernet applications • Tools and methods • Practical hints and advice on FM3 Ethernet solutions • Hands-on training

Spansion Support

- Please check the following website, for any available updates

  www.spansion.com

  www.spansion.com/starterkit

- Please contact your local support team for any technical question

  America: Spansion.Solutions@Spansion.com

  China: mcu-ticket-cn@spansion.com

  Europe: mcu-ticket-de@spansion.com

  Japan: mcu-ticket-jp@spansion.com

  Other: http://www.spansion.com/Support/SES/Pages/Ask-Spansion.aspx

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:

CCS Express GMBH
c/o Spansion International Inc.
Frankfurter Str. 83-107
D-65479 Raunheim
Germany

- This board is compliant with China RoHS

www.spansion.com