



SK-FM4-U120-9B560 SK-FM4-U120-9B560-MEM

Hardware V1.1 / Documentation V1.6



Warranty and Disclaimer

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2. The software deliverables are provided on an as-is basis without charge and are subject to alterations. It is the user's obligation to fully test the software in its environment and to ensure proper functionality, qualification and compliance with component specifications.

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

Except as otherwise provided in the following paragraphs, for a period of one (1) year from date of shipment to customer ("Warranty Period"), SPANSION warrants the hardware deliverables (i) are free of defects in material and workmanship, and (ii) conform to SPANSION applicable data sheet specifications (available at www.spansion.com or upon request).

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THESE WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NONINFRINGEMENT, AND ANY WARRANTY OTHERWISE ARISING OUT OF ANY PROPOSAL, SPECIFICATION OR SAMPLE. SPANSION NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITIES. THE FOREGOING CONSTITUTES CUSTOMER'S SOLE AND EXCLUSIVE REMEDY FOR THE FURNISHING OF DEFECTIVE OR NONCONFORMING DELIVERABLES.

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EXCEPT FOR DAMAGES FOR BODILY INJURY OR DEATH, SPANSION SHALL NOT BE LIABLE FOR ANY INDIRECT, INCIDENTAL, SPECIAL, RELIANCE, OR CONSEQUENTIAL DAMAGES, RELIANCE DAMAGES, AND/OR PUNITIVE, OR EXEMPLARY DAMAGES, WHETHER ANY SUCH DAMAGES ARE BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY, AND WHETHER OR NOT SPANSION HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES, AND NOTWITHSTANDING ANY FAILURE OF ESSENTIAL PURPOSE OF ANY LIMITED REMEDY.

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5. Should one of the above stipulations be or become invalid and/or unenforceable, the remaining stipulations shall stay in full effect.

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.



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- 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 <u>Spansion Support</u> in case of any question.



Overview

- MCU Features, Board Features & Contents
- Test it by a terminal / Test it by a GUI
- The Hardware / Pin Overview
- The Jumper Table / Jumper Default
- Board Power
- Software Examples & Tools
- Flash Programming
- JTAG / CMSIS-DAP
- IAR-Embedded Workbench
- KEIL µVision
- Workshops, Contacts & More



Additional documents

- Schematic
- Factsheet
- Data sheet MB9B560R Series and Errata
- Peripheral Manual and Errata
- Peripheral Manual (Timer Part) and Errata
- Peripheral Manual (Analog Part)
- Peripheral Manual (Communication Part) and Errata
- Flash Programming Manual and Errata

Please visit <u>www.spansion.com</u> to find latest releases of the above mentioned documents.



- The SK-FM4-U120-9B560 and SK-FM4-U120-9B560-MEM are based on the Spansion ARM[®] Cortex[®]-M4 device MB9BF568R
- The MB9B560R Series includes the following features:
 - Up to 1 MByte Flash Memory and 32 KByte Work Flash Memory
 - Up to 128 KByte RAM
 - Up to 160MHz clock
 - Up to 2 CAN controller 2.0A/B
 - Up to 8 UART / LIN / SPI / I²C interfaces
 - USB-Host/-Device interface
 - SD-Card interface
 - Three 12 bit ADCs, up to 24 channels
 - Two 12 bit DACs
 - Up to 16 channel external interrupts
 - Two Multifunction timer with waveform generator, e.g. Motor control
 - Timers (ICUs, OCUs, PPGs, others)

RC oscillator +/-2%	ARM Cortex-M4F – CPU	OCU x 6ch	ICU x 4ch
Clock Supervisor	160MHz (max) FPU	ADT x 3ch	FRTim x 3ch
Subclock (option)	2.7-5.5V Ta= -40°C to +105°C	Multi Function Timer	Waveform Generator
Low Voltage Detector 2ch	Main CLK: 4MHz SUB CLK: 32kHz MAIN RC CLK: 4MHz	PPG 6ch	QDU 2ch
Memory Protection Unit		Base Timer 8ch	External IRQs 16ch + NMI
WJ/TPIU/ETM Debug Ports	Package: LQFP80 , LQFP100, BGA112, LQFP120	Dual Timer	DMA 8ch
MFS(UART/SPI/I ² C) 8ch			CRC
USB FS Host+Device	MB9BF566M/N/R FLASH 512K+32K SRAM 64K	Resource Pin Relocation	Hardware Watchdog
CAN (32 MSB) 2ch	MB9BF567M/N/R FLASH 768K+32K SRAM 96K	12-bit ADC	RTC y:m:h;m:s
SDIO (SD card I/F)	MB9BF568M/N/R FLASH SRAM	12-bit ADC 24ch	
External Bus Interface* 8/16 Data, 25 Addr, 5/8CS	1024K+32K	12-bit ADC	12-bit DAC 2ch



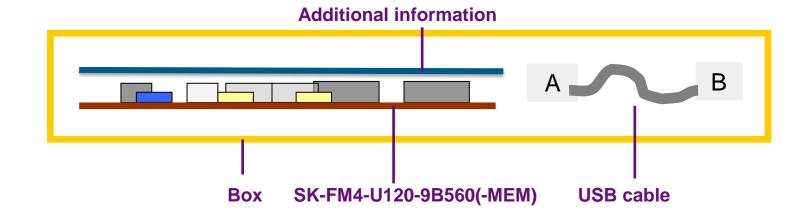
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• The SK-FM4-U120-9B560(-MEM) is available in two versions:

Feature	SK-FM4-U120-9B560	SK-FM4-U120-9B560-MEM	
External Power Supply	USB, DAP, JTAG or from SK-FM4-U-PERIPHERAL		
On-board Voltage	3.3V or 5V 3.3V		
User-LEDs, Reset-LED	3x User-LEDs (R,G,B) + Reset		
Buttons	3x buttons: Reset + External Interrupt + NMI		
Potentiometer	AN18 (0V On-board voltage 3.3V/5V)		
Debug interface	On-board CMSIS-DAP incl. Status LEDs (connected, running) (optional 20 pin JTAG-IF to be used with external JTAG adapter)		
Virtual COM port (USB-2-UART bridge)	Y	⁄es	
USB interface	USB Function (I	Vini-USB Type B)	
SD-Card interface	Yes	No	
External Memory	No	NAND-Flash: 32MByte SDRAM: 16MByte	



- The SK-FM4-U120-9B560(-MEM) contents
 - The SK-FM4-U120-9B560 or SK-FM4-U120-9B560-MEM evaluation board
 - One USB mini cable
 - 1-page flyer



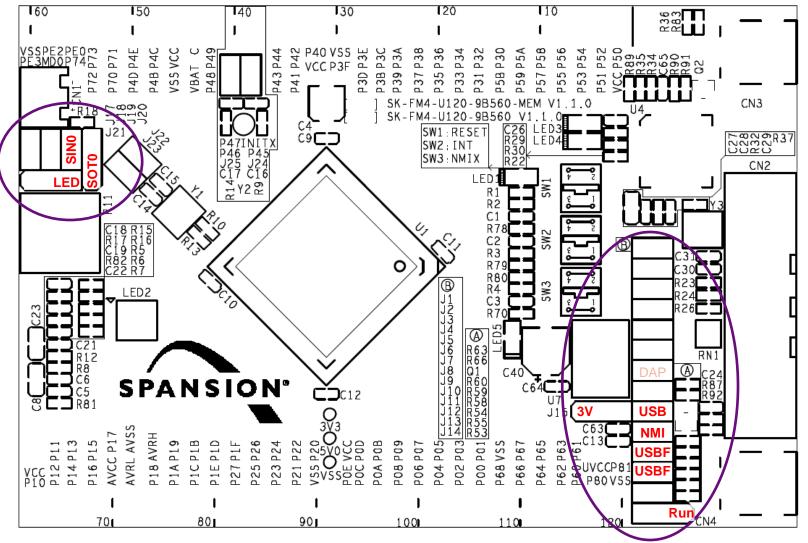




SK-FM4-U120-9B560 supports 5V and 3.3V operation SK-FM4-U120-9B560-MEM supports only 3.3V operation

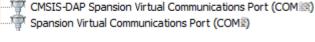
Please set J9 (USB) instead of J7 (CMSIS-DAP) Please set J19 and J20:1-2 (SIN0/SOT0)

Note:

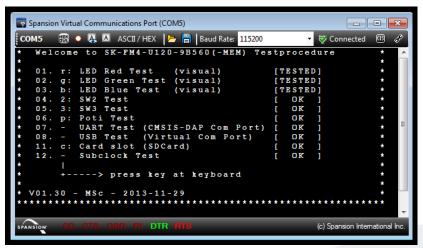


- The microcontroller on the SK-FM4-U120-9B560(-MEM) is already preprogrammed with a test application (<drive:>\sw-examples\testsoftware)
 - Install the USB driver first <drive:>\drivers\driverinstaller.exe
 - Connect the starter kit to CN4 (USB) with your PC
 - Ensure jumper J9 (USB) is set for correct power supply
 - Ensure jumper J19 and J20:1-2 are set correctly for use of SIN0/SOT0
 - Press the ,Reset'- Button
 - Check the availability for virtual COM port
 - e.g. Windows Device Manager
 - Open a serial terminal tool
 - e.g. Spansion Serial Port Viewer <drive:><u>\tools\serialportviewer\setup.exe</u>
 - Settings 115200 baud, 8N1
 - Press <space> to show welcome menu
 - Please select any function to test the on-board features

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Ports (COM & LPT)





- The microcontroller on the SK-FM4-U120-9B560(-MEM) is already preprogrammed with a test application (<drive:>\sw-examples\testsoftware)
 - Install the USB driver first <drive:>\drivers\driverinstaller.exe
 - Connect the starter kit to CN4 (USB) with your PC
 - Open the PC software <drive:><u>\sw-examples\testsoftware\SK-FM4-U120-9B560_demo.exe</u>
 - The picture of the board will be shown with current status of on-board features
 - LED allows control of the RGB-LED
 - Just click to the checkboxes
 - Status of user-buttons SW2 and SW3 are shown interactively
 - ADC represents the potentiometer R11







You finished successfully the first test

Congratulation!

Next section covers:

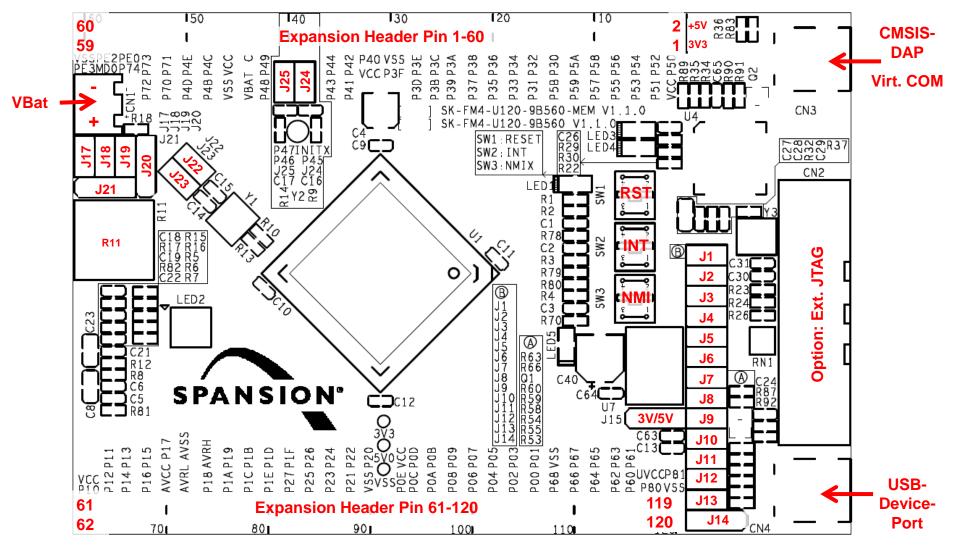
- The on-board features
- How to program the Flash
 - Serial ROM Boot loader
 - USB Direct
 - UART0
 - On-board CMSIS-DAP
 - JTAG with optional emulator
- How to start with IAR-Embedded-Workbench and KEIL $\mu Vision$

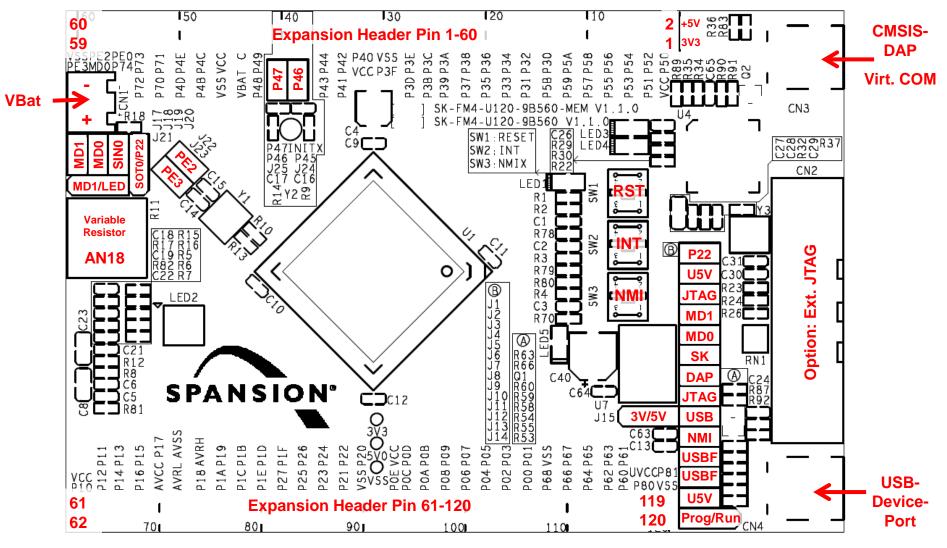


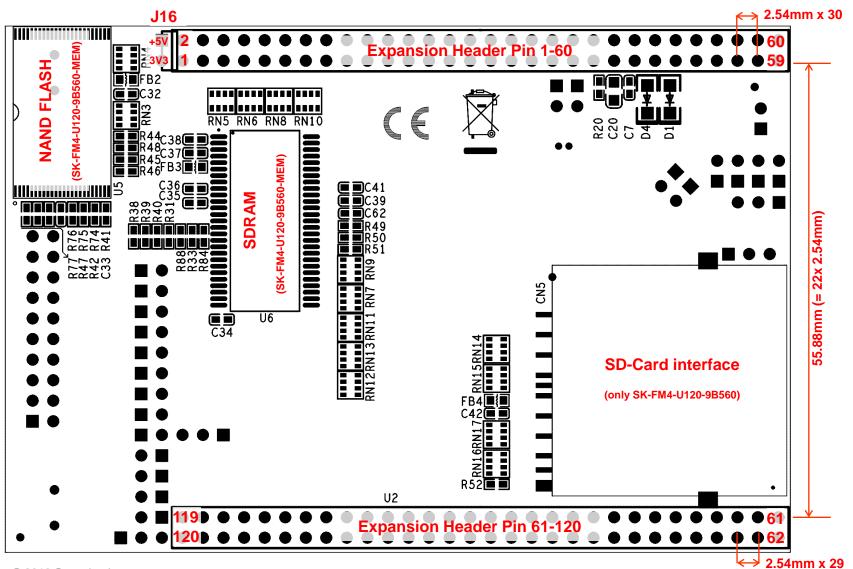


Hardware

The Hardware (Top Side) – Jumper Overview







The Hardware – Pin Overview 1 - 20

Pin	Microcontroller-Function	SK-FM4-U120-9B560	SK-FM4-U120-9B560-MEM
1	VCC	VCC_MCU 3V3 or 5V0	VCC_MCU 3V3 or 5V0
2	P50/CTS4_0/AIN0_2/RTO10_0/INT00_0/MADATA00_0		SDRAM, NAND FLASH
3	P51/RTS4_0/BIN0_2/RTO11_0/INT01_0/MADATA01_0		SDRAM, NAND FLASH
4	P52/SCK4_0/ZIN0_2/RTO12_0/MADATA02_0		SDRAM, NAND FLASH
5	P53/TIOA1_2/SOT4_0/RTO13_0/MADATA03_0		SDRAM, NAND FLASH
6	P54/TIOB1_2/SIN4_0/RTO14_0/INT02_0/MADATA04_0		SDRAM, NAND FLASH
7	P55/ADTG_1/SIN6_0/RTO15_0/INT07_2/MADATA05_0		SDRAM, NAND FLASH
8	P56/SOT6_0/DTTI1X_0/INT08_2/MADATA06_0		SDRAM, NAND FLASH
9	P57/SCK6_0/MADATA07_0		SDRAM, NAND FLASH
10	P58/SIN4_2/AIN1_0/INT04_2/MADATA08_0		SDRAM
11	P59/RX1_1/SOT4_2/BIN1_0/INT07_1/MADATA09_0		SDRAM
12	P5A/TX1_1/SCK4_2/ZIN1_0/MADATA10_0		SDRAM
13	P5B/CTS4_2/MADATA11_0		SDRAM
14	P30/TIOB0_1/RTS4_2/INT15_2/WKUP1/MADATA12_0		SDRAM
15	P31/TIOB1_1/SIN3_1/INT09_2/MADATA13_0		SDRAM
16	P32/TIOB2_1/SOT3_1/INT10_1/MADATA14_0		SDRAM
17	P33/ADTG_6/TIOB3_1/SCK3_1/INT04_0/MADATA15_0		SDRAM
18	P34/TX0_1/TIOB4_1/FRCK0_0/MNALE_0		NAND FLASH
19	P35/RX0_1/TIOB5_1/IC03_0/INT08_1/MNCLE_0		NAND FLASH
20	P36/SIN5_2/IC02_0/INT09_1/MNWEX_0		NAND FLASH



The Hardware – Pin Overview 21 - 40

Pin	Microcontroller-Function	SK-FM4-U120-9B560	SK-FM4-U120-9B560-MEM
21	P37/SOT5_2/IC01_0/INT05_2/MNREX_0		NAND FLASH
22	P38/SCK5_2/IC00_0/INT06_2	LED_G	LED_G
23	P39/ADTG_2/DTTI0X_0/RTCCO_2/SUBOUT_2/MSDCLK_0		SDRAM
24	P3A/TIOA0_1/AIN0_0/RTO00_0/MSDCKE_0		SDRAM
25	P3B/TIOA1_1/BIN0_0/RTO01_0/MRASX_0		SDRAM
26	P3C/TIOA2_1/ZIN0_0/RTO02_0/MCASX_0		SDRAM
27	P3D/TIOA3_1/RTO03_0/MAD00_0		SDRAM
28	P3E/TIOA4_1/RTO04_0/MAD01_0		SDRAM
29	P3F/TIOA5_1/RTO05_0/MAD02_0		SDRAM
30	VSS	GND	GND
31	VCC	VCC_MCU 3V3 or 5V0	VCC_MCU 3V3 or 5V0
32	P40/TIOA0_0/RTO10_1/INT12_1		
33	P41/TIOA1_0/RTO11_1/INT13_1		
34	P42/TIOA2_0/RTO12_1/MSDWEX_0		SDRAM
35	P43/ADTG_7/TIOA3_0/RTO13_1/MCSX8_0		SDRAM
36	P44/TIOA4_0/RTO14_1/DA0		
37	P45/TIOB0_0/RTO15_1/DA1		
38	INITX	Button Reset / JTAG	Button Reset / JTAG
39	P46/X0A	Sub-Crystal 32.768 kHz	Sub-Crystal 32.768 kHz
40	P47/X1A	Sub-Crystal 32.768 kHz	Sub-Crystal 32.768 kHz



The Hardware – Pin Overview 41 - 60

Pin	Microcontroller-Function	SK-FM4-U120-9B560	SK-FM4-U120-9B560-MEM
41	P48/VREGCTL		
42	P49/VWAKEUP	Pull-Down resistor	Pull-Down resistor
43	VBAT	Battery (CN1)	Battery (CN1)
44	C	Capacitor 4u7	Capacitor 4u7
45	VSS	GND	GND
46	VCC	VCC_MCU 3V3 or 5V0	VCC_MCU 3V3 or 5V0
47	P4B/TIOB1_0/SCS7_1/MAD03_0		SDRAM
48	P4C/TIOB2_0/SCK7_1/AIN1_2/MAD04_0		SDRAM
49	P4D/TIOB3_0/SOT7_1/BIN1_2/INT13_2/MAD05_0		SDRAM
50	P4E/TIOB4_0/SIN7_1/ZIN1_2/FRCK1_1/INT11_1/WKUP2/MAD06_0		SDRAM
51	P70/TX0_0/TIOA4_2/AIN0_1/IC13_1		
52	P71/RX0_0/TIOB4_2/BIN0_1/IC12_1/INT15_1		
53	P72/TIOA6_0/SIN2_0/ZIN0_1/IC11_1/INT14_2		
54	P73/TIOB6_0/SOT2_0/IC10_1/INT03_2	USB	USB
55	P74/SCK2_0/DTTI1X_1		
56	PE0/MD1	LED_B / MD1	LED_B / MD1
57	MD0	MD0	MD0
58	PE2/X0	Main-Crystal 4 MHz	Main-Crystal 4 MHz
59	PE3/X1	Main-Crystal 4 MHz	Main-Crystal 4 MHz
60	VSS	GND	GND



The Hardware – Pin Overview 61 - 80

Pin	Microcontroller-Function	SK-FM4-U120-9B560	SK-FM4-U120-9B560-MEM
61	VCC	VCC_MCU 3V3 or 5V0	VCC_MCU 3V3 or 5V0
62	P10/AN00/RX1_2/SIN1_1/FRCK0_2/INT02_1/MAD07_0		SDRAM
63	P11/AN01/TX1_2/SOT1_1/IC00_2/MAD08_0		SDRAM
64	P12/AN02/SCK1_1/IC01_2/RTCCO_1/SUBOUT_1/MAD09_0		SDRAM
65	P13/AN03/SIN0_1/IC02_2/INT03_1/MAD10_0		SDRAM
66	P14/AN04/SOT0_1/IC03_2/MAD11_0		SDRAM
67	P15/AN05/SCK0_1/MAD12_0		
68	P16/AN06/SIN2_2/INT14_1/MAD13_0		
69	P17/AN07/SOT2_2/WKUP3/MAD14_0		SDRAM
70	AVCC	VCC_MCU	VCC_MCU
71	AVSS	GND	GND
72	AVRL	GND	GND
73	AVRH	VCC_MCU	VCC_MCU
74	P18/AN08/SCK2_2/MAD15_0		SDRAM
75	P19/AN09/SIN4_1/IC00_1/INT05_1/MAD16_0		
76	P1A/AN10/SOT4_1/IC01_1/MAD17_0		
77	P1B/AN11/SCK4_1/IC02_1/MAD18_0		
78	P1C/AN12/CTS4_1/IC03_1/MAD19_0		
79	P1D/AN13/RTS4_1/DTTI0X_1/MAD20_0		
80	P1E/AN14/ADTG_5/FRCK0_1/MAD21_0		



The Hardware – Pin Overview 81 - 100

Pin	Microcontroller-Function	SK-FM4-U120-9B560	SK-FM4-U120-9B560-MEM
81	P1F/ADTG_4/TIOB6_2/RTO05_1		
82	P27/TIOA6_2/RTO04_1/INT02_2	LED_R	LED_R
83	P26/TIOB5_0/SCK2_1/RTO03_1		
84	P25/TX1_0/TIOA5_0/SOT2_1/RTO02_1		
85	P24/RX1_0/SIN2_1/RTO01_1/INT01_2		
86	P23/AN15/TIOA7_1/SCK0_0/RTO00_1/MAD22_0		
87	P22/CROUT_0/AN16/TIOB7_1/SOT0_0/ZIN1_1	JTAG	JTAG
88	P21/AN17/SIN0_0/BIN1_1/INT06_1/MAD23_0	JTAG	JTAG
89	P20/AN18/AIN1_1/INT05_0/MAD24_0	Potentiometer R11	Potentiometer R11
90	VSS	GND	GND
91	VCC	VCC_MCU 3V3 or 5V0	VCC_MCU 3V3 or 5V0
92	P0E/TIOB5_2/SCS6_1/IC13_0/S_CLK_0/MDQM1_0	SD-Card	SDRAM
93	P0D/TIOA5_2/SCK6_1/IC12_0/S_CMD_0/MDQM0_0	SD-Card	SDRAM
94	P0C/TIOA6_1/SOT6_1/IC11_0/S_DATA1_0/MALE_0	SD-Card	
95	P0B/TIOB6_1/SIN6_1/IC10_0/INT00_1/S_DATA0_0/MCSX0_0	SD-Card	NAND FLASH
96	P0A/SIN1_0/FRCK1_0/INT12_2/S_DATA3_0/MCSX1_0	SD-Card	
97	P09/AN19/TRACED0/TIOA3_2/SOT1_0/S_DATA2_0/MCSX5_0	SD-Card	
98	P08/AN20/TRACED1/TIOB3_2/SCK1_0/MCSX4_0		
99	P07/AN21/TRACED2/TIOA0_2/SCK7_0/MCLKOUT_0		
100	P06/AN22/TRACED3/TIOB0_2/SOT7_0/MCSX3_0		



The Hardware – Pin Overview 101 - 120

Pin	Microcontroller-Function	SK-FM4-U120-9B560	SK-FM4-U120-9B560-MEM
101	P05/AN23/ADTG_0/TRACECLK/SIN7_0/INT01_1/MCSX2_0		
102	P04/TDO/SWO	JTAG	JTAG
103	P03/TMS/SWDIO	JTAG	JTAG
104	P02/TDI/MCSX6_0	JTAG	JTAG
105	P01/TCK/SWCLK	JTAG	JTAG
106	P00/TRSTX/MCSX7_0	JTAG	JTAG
107	VSS	GND	GND
108	P68/TIOB7_2/SCK3_0/INT00_2	Button INT	Button INT
109	P67/TIOA7_2/SOT3_0		
110	P66/ADTG_8/SIN3_0/INT11_2		
111	P65/TIOB7_0/SCK5_1		
112	P64/TIOA7_0/SOT5_1/INT10_2		
113	P63/CROUT_1/RX0_2/SIN5_1/INT03_0/S_CD_0/MWEX_0	SD-Card	
114	P62/ADTG_3/TX0_2/SIN5_0/INT04_1/S_WP_0/MOEX_0	SD-Card	
115	P61/UHCONX0/TIOB2_2/SOT5_0/RTCCO_0/SUBOUT_0	USB	USB
116	P60/TIOA2_2/SCK5_0/NMIX/WKUP0/MRDY_0	Button NMIX	Button NMIX
117	USBVCC	3V3	3V3
118	P80/UDM0	USB	USB
119	P81/UDP0	USB	USB
120	VSS	GND	GND



Jumper table

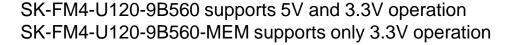
Jumper	Function	SK-FM4-U120-9B560(-MEM) (Default setting marked bold)
J1 (2 pin)	CMSIS-DAP Crystal (P22) (Do not change!)	Open: 4MHz Closed: 48MHz
J2 (2 pin)	VBUS detection of CMSIS-DAP	Open: 3V3 Closed: 5V (only for SK-FM4-U120-9B560)
J3 (2 pin)	CMSIS-DAP reset	Open: CMSIS-DAP normal operation Closed: CMSIS-DAP reset assert
J4 (2 pin)	Operation of MD1 (CMSIS-DAP)	Open: Run-Mode Closed: Test-Mode
J5 (2 pin)	Operation of MD0 (CMSIS-DAP)	Open: Run-Mode (CMSIS-DAP) Closed: Firmware update of CMSIS-DAP
J6-J9	Power Supply Source Please select just one power source!	J9: USB Host powered (CN4) J8: JTAG powered (CN2) J7: CMSIS-DAP powered (CN3) J6: Powered by SK-FM4-U-PERIPHERAL (J16)
J10 (2 pin)	SW3 NMI Jumper J10 needs to be opend for programming	Open: Button SW3 disconnected / Programming mode Closed: Button SW3 (NMI) is connected
J11 (2 pin)	USB D+	Open: USB is disconnected Closed: USB is connected
J12 (2 pin)	USB D-	Open: USB is disconnected Closed: USB is connected
J13 (2 pin)	VBUS detection	Open: 3V3 Closed: 5V (only for SK-FM4-U120-9B560)

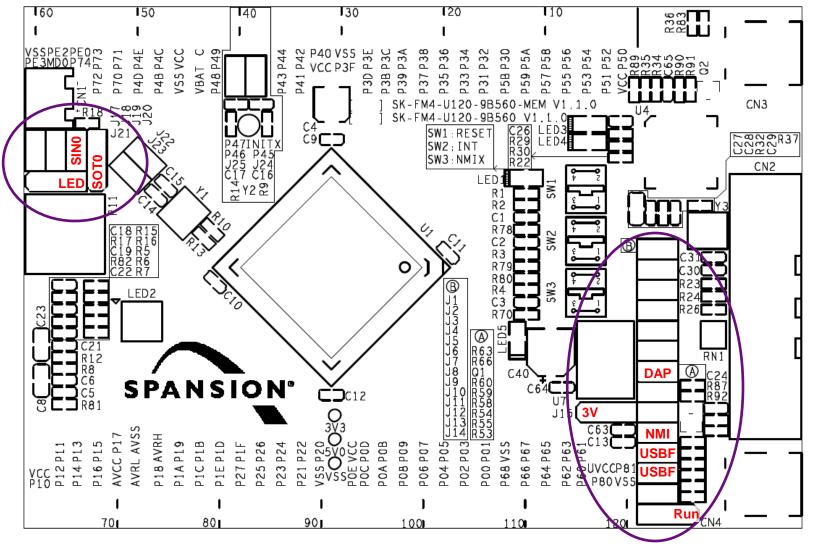


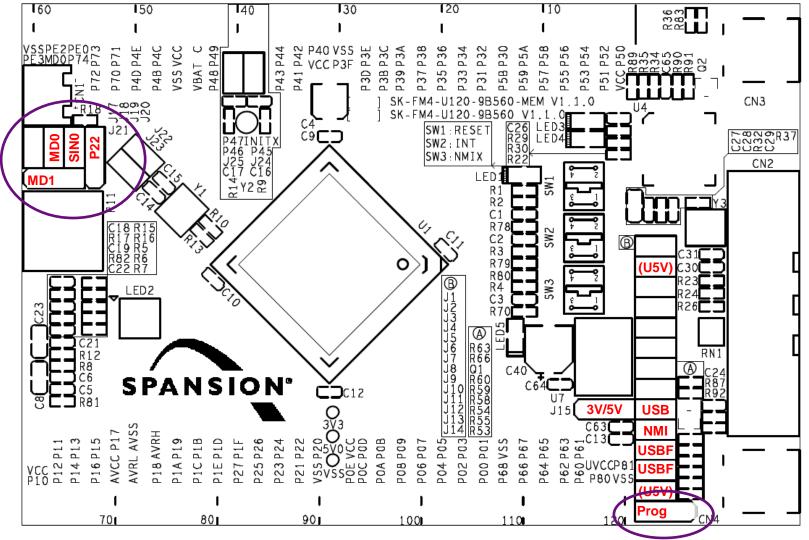
Jumper table (continued)

Jumper	Function	SK-FM4-U120-9B560(-MEM) (Default setting marked bold)
J14 (3 pin)	USB VBUS detection See also J10	1-2: VBUS is connected to INT03_2 (Run-Mode) 2-3: VBUS is connected to NMIX (Programming Mode)
J15 (3 pin)	MCU voltage selection SK-FM4-U120-9B560-MEM can be used with 3V3 only	1-2: MCU is powered from 3V3 2-3: MCU is powered from 5V (not SK-FM4-U120-9B560-MEM)
J17 (2 pin)	Operation of MD1 (Do not change!)	Open: Run-Mode and Programming-Mode Closed: Test-Mode
J18 (2 pin)	Operation of MD0	Open: Run-Mode Closed: Programming-Mode
J19 (2 pin)	CMSIS-DAP Virtual COM port (SIN0_0)	Open: SIN0 is disconnected from CMSIS-DAP Closed: CMSIS-DAP's virtual COM port is connected
J20 (3 pin)	CMSIS-DAP Virtual COM port (SOT0_0)	2-3: SOT0/P22 is used for USB programming 1-2: CMSIS-DAP's virtual COM port is connected
J21 (3 pin)	MD1/PE0 See also J17	1-2: MD1 (Programming-Mode) 2-3: PE0 (LED Blue)
J22 (2 pin)	X0/PE2 Do not close J22 if crystal Y1 is assembled.	Open: PE2 is disconnected Closed: PE2 is connected to pin header U2
J23 (2 pin)	X1/PE3 Do not close J23 if crystal Y1 is assembled.	Open: PE3 is disconnected Closed: PE3 is connected to pin header U2
J24 (2 pin)	X0A/P46 Do not close J24 if crystal Y2 is assembled.	Open: P46 is disconnected Closed: PE2 is connected to pin header U2
J25 (2 pin)	X1A/P47 Do not close J25 if crystal Y2 is assembled.	Open: P47 is disconnected Closed: PE2 is connected to pin header U2



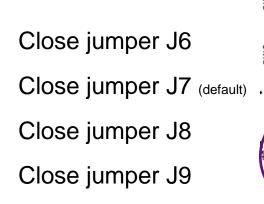


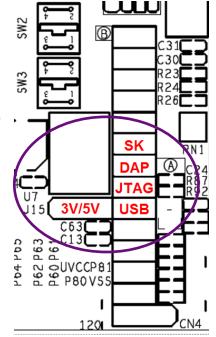




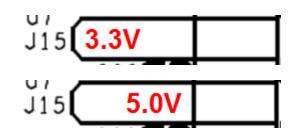
Jumper – Power the Starter kit

- The starter kit can be powered
 - by peripheral base-board (J16):
 - by CMSIS-DAP (CN3):
 - by external JTAG (CN2):
 - by USB-host (CN4):





- 3.3V or 5V
 - Jumper J15 selects the target voltage
 - SK-FM4-U120-9B560 can operate 3.3V or 5V
 - SK-FM4-U120-9B560-MEM can operate 3.3V only
 - Default: J15: 1-2 (3.3V)







Software

Software Examples (1/2) - Simple Software

- Simple example that demonstrates the usage of some peripherals
 - Available for IAR EWARM or KEIL µVision:
 - See <drive:><u>\sw-examples\</u> or <u>www.spansion.com</u>
 - mb9bf56xr template
 - ,Empty' project as base for user applications
 - mb9bf56xr_adc_dvm
 - Digital Voltage Meter based on the A/D-Converter and UART
 - mb9bf56xr gpio
 - I/O example to control LEDs and readout the user buttons
 - mb9bf56xr_mfs
 - An UART example allows serial communication



Software Examples (2/2) – Peripheral Driver Library (PDL)

- Example projects that are built with PDL (Peripheral Driver Library)
 - Available for IAR EWARM or KEIL µVision:

See <drive:>\sw-examples\ or www.spansion.com

- mb9bf56xr_pdl

- The Peripheral Drivel Library (PDL) includes an API for all peripherals
 - mb9bf56xr_pdl_adc_dvm : Example for ADC
 - mb9bf56xr_pdl_gpio : Example for simple IO access
 - mb9bf56xr_pdl_mfs
 Example for serial communication (UART)
 - mb9bf56xr_pdl_template : Project frame for user applications based on PDL
- Functional test
 - <u>tp_sk-fm4-u120-9b560</u>
 - Program for testing the board features (LEDs, buttons, ADC, USB, ...)



ABBBBB

- The following software utility tools are available
 - USB Virtual-COM port
 - allows UART communciation via the PC's USB connection
 - On-board UART-2-USB converter (via CN3, CMSIS-DAP)
 - For driver installation <drive:><u>\drivers\driverinstaller.exe</u>
 - FLASH USB DIRECT Programmer
 - Microcontroller Flash programming (via CN4, USB-Device-Port)
 - Install from <drive:>\tools\USBDIRECT\setup.exe
 - Terminal program ,Serial Port Viewer'
 - Install from <drive:><u>\tools\serialportviewer\setup.exe</u>





Flash Programming

- There are several options to program the microcontroller's flash:
 - FLASH USB DIRECT Programmer via CN4 (USB)
 - For installation <drive:><u>\tools\USBDIRECT\setup.exe</u>
 - USB driver is located in subdirectory of FLASH USB DIRECT Programmer
 - FLASH MCU Programmer via CN3 (Serial by use of virtual COM-port)
 - For installation <drive:><u>\tools\PCWFM\setup.exe</u>
 - For driver installation of USB/Virtual-COM port <drive:><u>\drivers\driverinstaller.exe</u>
 - JTAG Programming via CN3 (CMSIS-DAP)
 - Example is given for <u>IAR</u> and <u>KEIL</u>
 - See documentation of your development suite, how to setup CMSIS-DAP
 - JTAG Programming via CN2 (optional JTAG adapter)
 - The correct JTAG-adapter must be selected in the IDE toolchain
 - No dedicated jumper setting is required



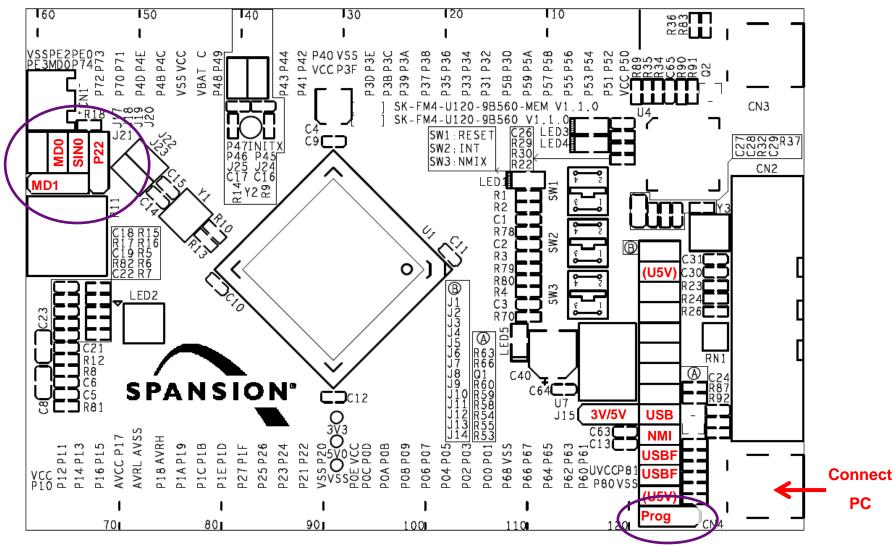
<u>888886</u>

- FLASH USB DIRECT Programming via CN4 (USB)
 - Jumper Setting
 - Close J9 (Power:USB), J11 (USB D+), J12 (USB D-) and J18 (MD0)
 - Set J14 to position 2-3 (P60, USB_VCC_DETECT)
 - Set J20 to position 2-3 (P22)
 - Set J21 to position 1-2 (MD1)
 - For 5V operation set J15 to 2-3, close J2 and J13
 - For 3.3V operation set J15 to 1-2, open J2 and J13
 - Connect the board via USB-Device (CN4) to the USB-Port of the PC
 - If connected for first time Windows OS may ask for a driver
 - See subfolder ,driver' of USBdirect installation path or <drive:><u>\tools\USBDIRECT\driver</u>
 - Start the FLASH USB DIRECT Programmer
 - For first installation: <drive:><u>\tools\USBDIRECT\setup.exe</u>



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Flash Programming via CN4 (USB direct)

- Choose the right target MCU MB9BF568M/N/R
- Browse for the programming file (*.srec or *.hex)
 - IAR: see subfolder <project>\example\IAR\output\release\exe
 - ARM/KEIL: see subfolder <project>\example\ARM\output\release
- Adjust the corresponding virtual COM-port

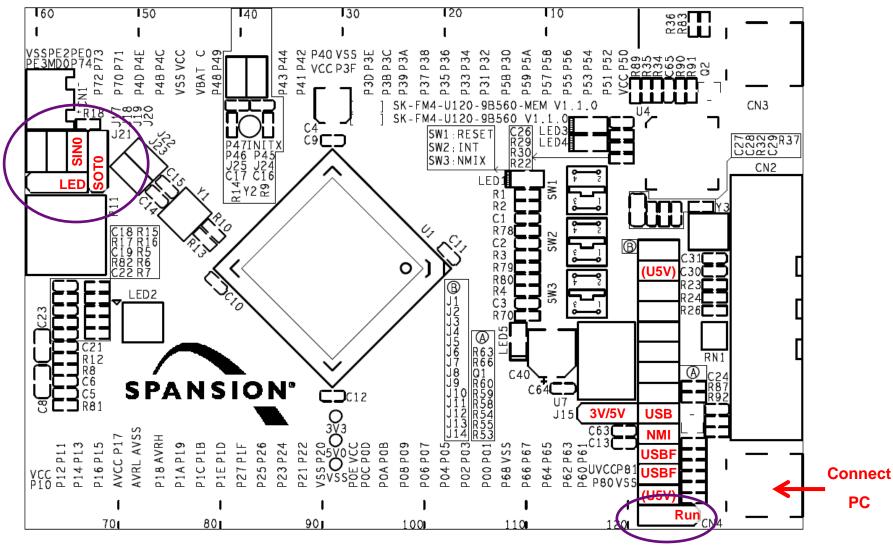
Select MCU: MB9BF568M/N/R Select file (*.srec; *.hex) Select Virtual COM-port

- Use Full Operation
 - Download
 - Erase / Blank check
 - Program & Verify
- Reset jumpers and return to <u>Run-mode</u> jumper setting

FLASH USB DIREC	T Programmer				
-SELECT			FLASH INFORM	IATION	
Target MCU	MB9BF568M/N/R	-	Start Addr	End Addr	Size
			00000000H	000FFFFFH	00100000H
Hex File	mb9bf56xr_io.srec	(<u>O</u> pen)	00400000H	00400001H	00000002H
COM (1-255)	22		200C0000H	200C7FFFH	00008000H
-Command to CO	M22			1	
	<u>F</u> ull Operatio	on(D+E+B+P)	Set Environ	ment	Help
	ı ———		Check SU	M 🛛 🗹	ersion Info
<u>D</u> ownload	Erase	Blank Check			
				IRECT	Virtual COM
Program & Verify	<u>R</u> ead & Compare		rammer		





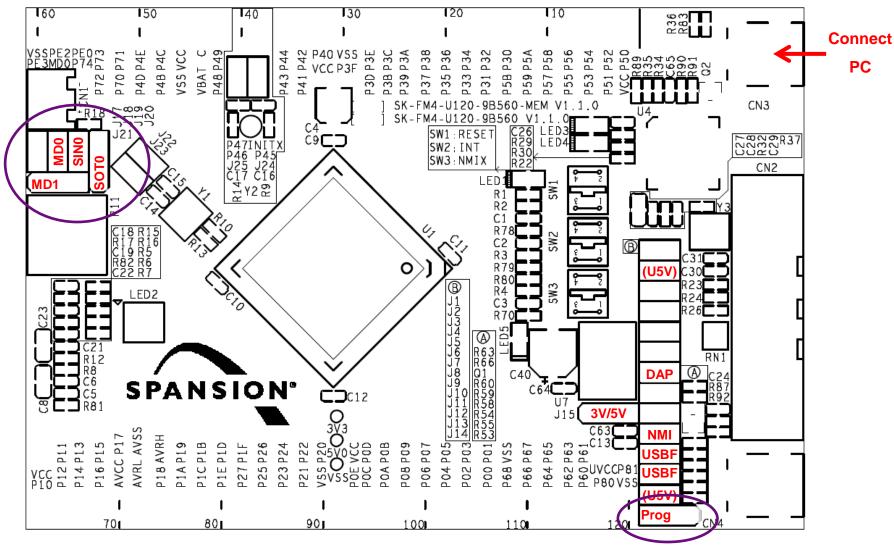


- FLASH MCU Programming via CN3 (Serial)*
 - Jumper setting
 - Open jumpers J3 (JTAG) and J10 (NMIX)
 - Close jumpers J7 (Power: DAP), J18 (MD0) and J19 (SIN0)
 - Do not set J9 (USB Host powered)!
 - Set J20 to position 1-2 (SOT0)
 - Set J21 to position 1-2 (MD1)
 - Check jumper setting: J14:2-3 (P60)
 - Connect the board via USB CMSIS-DAP (CN3) to the USB-Port of the PC
 - When connected for first time Windows OS may ask for ,spansionusbvcomm.inf'
 - <drive:><u>\drivers\cmsis-dap</u>
 - Use the FLASH MCU Programmer for FM3/FM4
 - For installation <drive:><u>\tools\PCWFM\setup.exe</u>

*Note: Do not connect CN4 to PC/USB while using serial programming



Jumper setting PRG-mode using CMSIS-DAP (serial communication)



Flash Programming via CN3 (Serial)

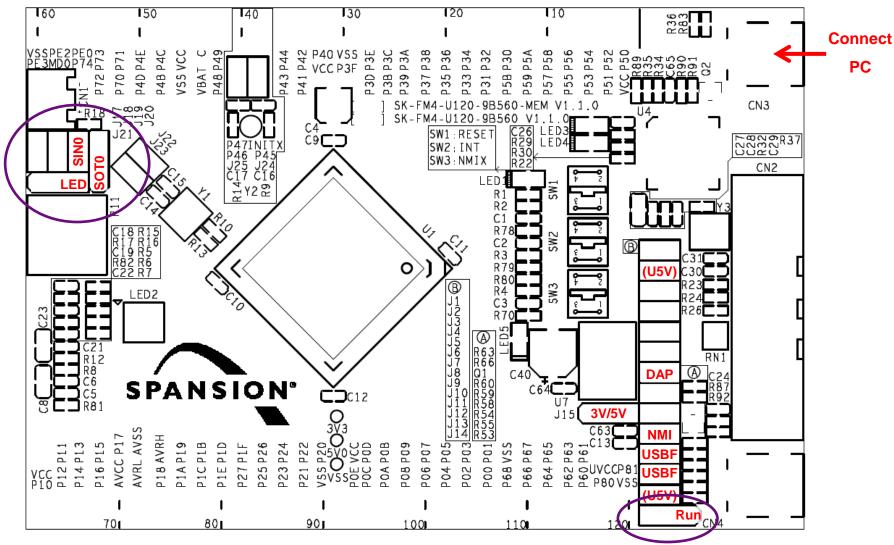
- Choose the right target MCU MB9BF568M/N/R
- Select 4MHz Crystal Frequency
- Browse for the programming file (*.srec or *.hex)
 - IAR: see subfolder <project>\example\IAR\output\release\exe
 - ARM/KEIL: see subfolder <project>\example\ARM\output\release
- Adjust the corresponding virtual COM-port

	🗮 FUJITSU FLASH MC	U Programmer for FI	M3 / FM4			
Select MCU: MB9BF568M/N/R				Flash Informatio	n	
Select 4MHz Crystal Frequency	<u>T</u> arget MCU	MB9BF568M/N/R	▼	Start Addr	End Addr	Size
Select file (*.srec / *.hex)	Crystal Frequency	4MHz	T	00000000H	000FFFFFH	00100000H
	Hex File	mb9bf56xr_io.srec	Open	200C0000H	200C7FFFH	00000002H
Select Virtual COM-port	-Command to COM	A23				
Execute ,Full Operation'				·	, 	
incl. stand-alone operations		<u>F</u> ull Operatio	on(D+E+B+P)	Set Environn	nent	Help
- <u>D</u> ownload	Download	Erase	Blank Check	Check SU	м	V01,L07
- Erase	Program & Verify	Read & Compare	Conu	FUJITSU FLASH	MCU PROGRAM	
- Blank Check		read & Compare	<u>С</u> ору		FME	FM4

- Program&Verify
- Reset jumpers and return to <u>Run-mode</u> jumper setting



Jumper setting RUN-mode using CMSIS-DAP (serial communication)



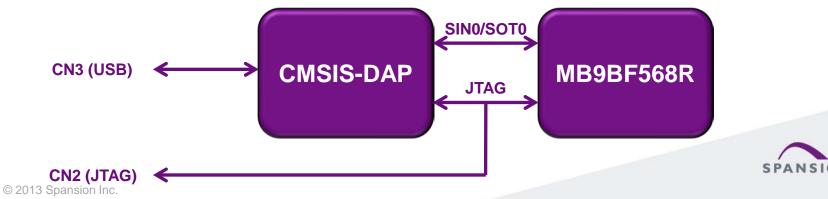


JTAG Debugger

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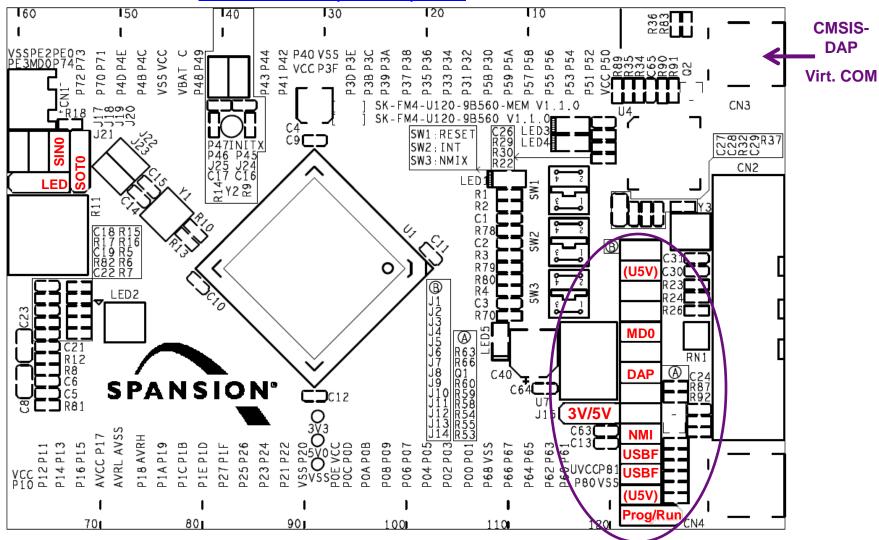
- This starter kit includes an on-board JTAG adapter
 - Compatible to CMSIS-DAP
 http://www.keil.com/support/man/docs/dapdebug/dapdebug_introduction.htm
 - Please update the on-board CMSIS-DAP with latest firmware
 - Select debugger CMSIS-DAP in your tool chain
- Any other JTAG-adapter can be connected to CN2, too.
 - Select used JTAG-adapter within IDE tool chain (No jumper setting is required)

- Additional virtual COM port is provided by CN3
 - For driver installation <drive:><u>\drivers\driverinstaller.exe</u>
 - Please set jumper J19 and J20 accordingly



Please see instructions coming with Firmware update package!

See <drive:>tools\cmsisdap_fw_update



Test it by terminal using CMSIS-DAP

- The microcontroller on the SK-FM4-U120-9B560(-MEM) is already preprogrammed with a test application (<drive:>\sw-examples\testsoftware)
 - Install the USB Driver first <drive:>\drivers\driverinstaller.exe
 - Connect the starter kit to CN3 (CMSIS-DAP) with your PC
 - Ensure jumper J7 (CMSIS-DAP) is set for correct power supply
 - Press the ,Reset'- Button
 - Check the availability for virtual COM port
 - e.g. Windows Device Manager
 - Open a serial terminal tool
 - e.g. Spansion Serial Port Viewer <drive:><u>\tools\serialportviewer\setup.exe</u>
 - Settings 115200 baud, 8N1
 - Press <space> to show welcome menu
 - Please select any function to test the on-board features



ſ		Spansio	n Virtu	ual Comi	munica	ations P	ort (CC	IM5)								x
	c c	DM5	HEX	0 👰	A A	SCII / H	EX 🛛	- 🔒	Baud Rate:	115200		•	🤯 Co	onnected	œ	ð,
	*	Wel	come	e to	SK-	FM4 -	U 1 2 0	- 9 B 5	60 (-ME	M) Te:	stp	roce	dure		*	^
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Setup in IAR EWARM (1)

- Navigate to project options:
 - Via Files-List
 - Right-click at the project
 - Select [Options...]
 - Or via menu tab [Project]
 - Select [Options...]



Create New Project...

Add Existing Project...

ALT+F7

Options...

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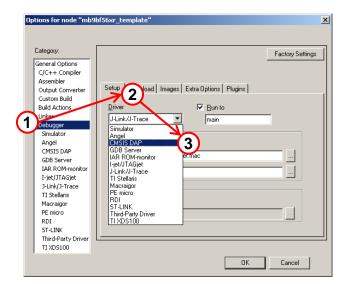


JTAG adapter CMSIS-DAP – within IAR EWARM

Setup in IAR EWARM (2)

- Setup Project Debbuger Options
 - (1) Navigate to [Debugger]
 - (2) Select tab [Setup]
 - (3) Select driver [CMSIS-DAP]

- (4) Select in [CMSIS-DAP]
- (5) Select tab [JTAG/SWD]
- (6) Select [SWD]



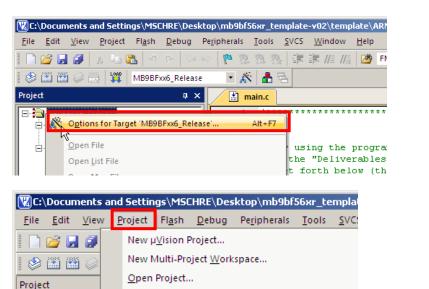
Category:	Factory Settin	ngs
General Options C/C++ Compiler Assembler Output Converter Output Converter Custon Build Build Actions Linker Debugge Simpator Angel CMSIS DAP GDB Server IAR. ROM-monitor Li-jet/JTAGjet	JTAG/SWD Breakpoints Probe configuration JTAG JTAG JTAG JTAG JTAG JTAG JTAG/SWD speed Auto detect	
3-Link/J-Trace TI Stellaris Macraigor PE micro RDI ST-LINK Third-Party Driver TI XD5100		



JTAG adapter CMSIS-DAP – within Keil µVision

Setup in Keil µVision (1)

- Navigate to project options:
 - Via Project
 - Right-click at the project
 - Select [Options...]
 - Or via menu tab [Project]
 - Select [Options...]



Select Device for Target 'MB9BFxx6 Release'...

Options fo Jarget 'MB9BFxx6_Release'.

Close Project

Export

Manage

Remove Item

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JTAG adapter CMSIS-DAP – within Keil µVision

Setup in Keil µVision (2)

- Setup Debug & Utilities
 - (1) Select tab [Debug]
 - (2) Select [CMSIS-DAP Debugger]

- (3) Select tab [Utilities]
- (4) Select [CMSIS-DAP Debugger]

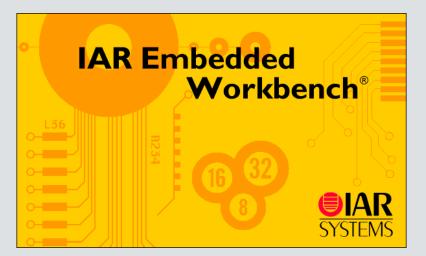
🖁 Options for Target 'MB9BFxx6_Release'	
Device Target Output Listing User C/C++ Asm	Linker Debug Utilities
C Use <u>S</u> imulator Settings □ Limit Speed to Real-Time	Signum Systems JTAGjet
Coad Application at Startup F Run to main() Initialization File: Initialization File: Restore Debug Session Settings F Breakpoints F Toolbox F Watch Windows & Performance Analyzer Memory Display CPU DLL: Parameter:	Image: Structure of the constraint of the constr
SARMCM3.DLL Dialog DLL: Parameter: DCM.DLL pCM4	SARMCM3.DLL Dialog DLL: Parameter: TCM.DLL pCM4
OK (Cancel Defaults Help
Options for Target "MB9BFxx6_Release" Device Target Dutput Listing User C/C++ Asm Configure Flash Menu Command G Use Target Driver for Flash Programming ULINK2/ME Cortex Debugger Init File: JHIK // Trace Cortex Signum Systems JTAGiet JHIK // Trace Cortex Signum Systems JTAGiet JULINK Pro Cortex Debugger Command: ST-Link (Deprecated Version) ULINK Debugger Command: ST-Link (Deprecated Version) SiLabs UDA Debugger SiLabs UDA SiLabs UDA Debugger SiLabs UDA SiLabs UDA Debugger SiLabs UDA SiLabs UDA	Linker Debug Utilities 3 Settings Update Target before Debugging , Edit
Arguments: ST-Link Debugger CMSIS:0AP Debugger Fast Models Debugger	
	Cancel Defaults Help





IAR Embedded Workbench

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



- 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 \rightarrow Open \rightarrow Workspace
 - e.g.: <drive:><u>\sw-examples\mb9bf56xr_gpio-v11\example\IAR\mb9bf56xr_io.eww</u>





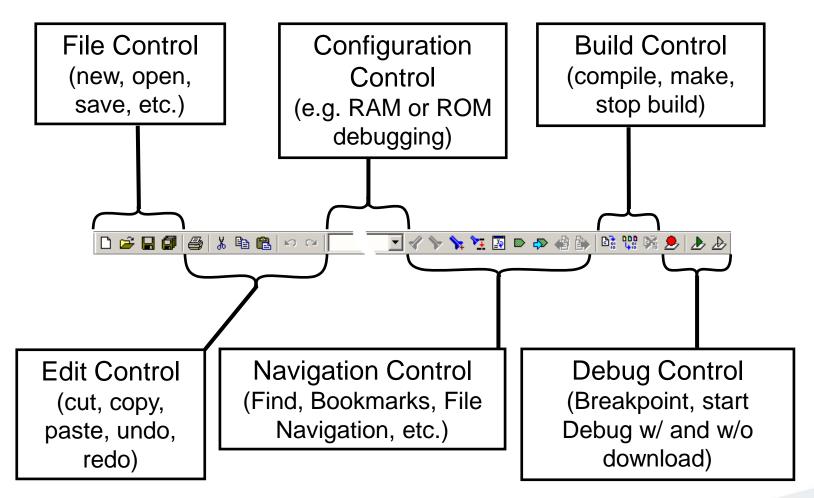
BBBBBB

- 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 \rightarrow Open \rightarrow Workspace \rightarrow *.eww
 - For new projects start with ,mb9bf56xr_template'

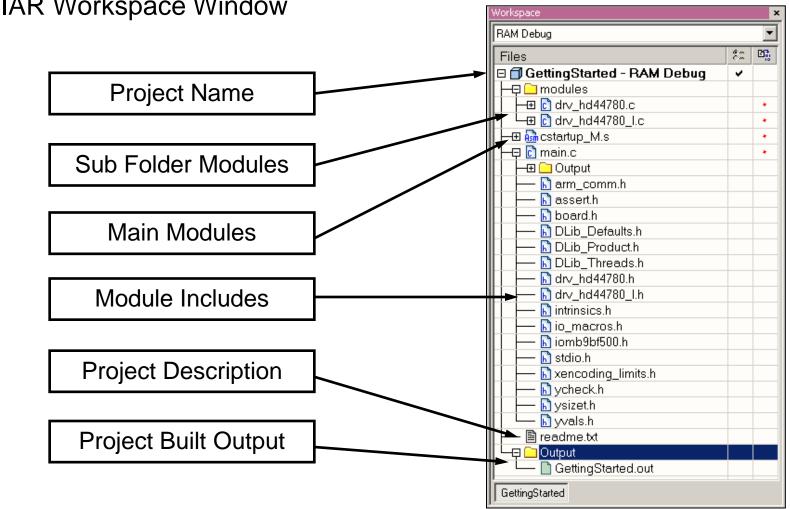
Edit View Project		ch ID ols = \] >
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space				nformation Center for ARM	-
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es J GettingStar E <mark>C modules</mark> E B cstartup_M.s		107 <u>8</u> 0 *			
i 💼 colatap_trio i 💽 main.c - 🖹 readme.txt i 🦲 Output		*	-	Information Center for ARM Information Center for ARM [EXAMPLES	
- ouput			-	Example description	
			-	######################################	
			-	# # **********************************	
				DESCRIPTION	
			-	This example project shows how to use the IAR Embedded Workbench for ARM to develop code for IAR KSK-MB9BF506 board. It shows basic use of VO, Dual timer and the interrupt controller.	
				COMPATIBILITY ==========	
				The example project is compatible with IAR KSK-MB9BF506 board. By default, the project is configured to use the J-Link SWD interface.	
				CONFIGURATION	
			-	The GettingStarted application is downloaded to the iFlash or iRAM memory depending on selected configuration and executed.	
			-	GETTING STARTED	
				1) Start the IAR Embedded Workbench for ARM.	
tingStarted			1	fo II	-



IAR Menu Bar











- Making the Project
 - Use Make-Icon (😳), <F7> or Menu: Project→Make
 - Check for no errors in Output window below
 - Build errors are indicated by ¹/₄ or ³/₈ In Output window and Source view

h] ysizet.h

lessages.

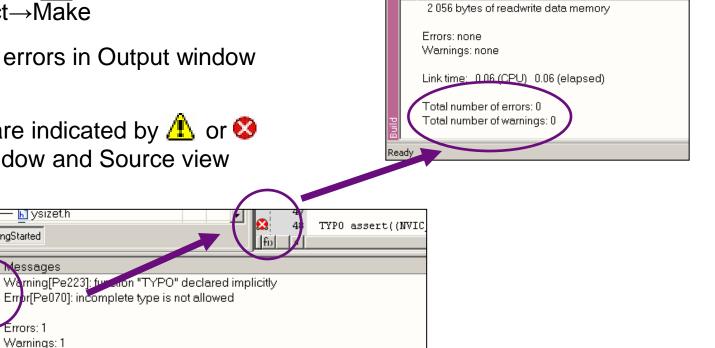
Errors: 1 Warnings: 1

😣 Error[Pe070]: incomplete type is not allowed

😣 Error while running C/C++ Compiler

Total number of errors: 1 Total number of warnings: 1

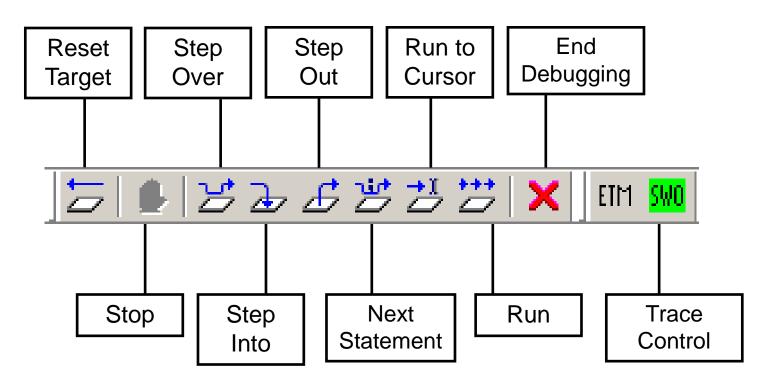
GettingStarted



Messages

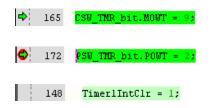


- Download to Target and Start Debugging
 - Use ▶ Icon, <Ctrl>-D, or Project→Download and Debug
 - A new menu bar will occur on sucessful connection to target





- Source Window
 - The Source windows do not change contents but get additional information
 - Current line (PC):
 - Halted on Breakpoint:
 - Halted on Data break (example):
- Disassembly Window
 - Shows 'pure' disassebly view
 - Shows mixed mode view



	Disa	assembly						×
		Goto	Memory	•				
		0x1fffc3bc: <u>if(!(BUT_P</u>		STR	r1,	[r0]		_
		??main_4: Ox1fffc3be: Ox1fffc3c0:		LDR.N LDR		??DataTable10_33	[0x1fffc450] ; P	DIR5
	⇒	0x1fffc3c2: 0x1fffc3c4:	0x0780	LSLS BMI N	- r0,	[r0] r0, #30 ain 2	: 0x1fffc380	
		Timer1Co	ntrol bit.Timer	<u>En = 1;</u>		-	,	
		0x1fffc3c6: 0x1fffc3c8: 0x1fffc3c8:		LDR.N LDR ORRS W	r0,	??DataTable10_32 [r0] r0 #128	. 0v80	imericontrol
l	• [▶



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

Watch				×	
Expression	Value	Location	Туре		
Tmr1Tick	0	0x20000804	int		
Watch Locals Statics Auto Live Watch Quick Watch X					

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

Quick Watch			×		
C Tmr1Tick + 0xAA - 123			•		
Expression Tmr1Tick + 0xAA - 123	Value 0x00000030	Location	Type int		
	0.000000000				
Watch Locals Statics Auto Live Watch Quick Watch X					

The drop down menu memorizes the last typed contents



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IAR Workbench – Simulator

Simulator

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

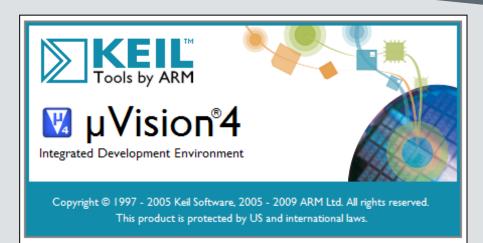
Workspace	drv_hd44780.c drv_hd44780_l.c main.c
RAM Debug	Options for node "GettingStarted"
Files GettingStarted - RAM Debug * modules modules	Options for node "GettingStarted" X Category: Factory Settings General Options C/C++ Compile Assembler Output Converting Output Converting Setup Custom Build Build Actions Linker Simulator Simulator Setup macros Angel GB Server IAR ROM-monitor Setup macros J-Link/J-Trace IMI FTDI Macraigor Devige description file
	T L EVerge description tile
ysizeth ↓ ↓ hysizeth ↓ ↓ysizeth ↓ ysizeth	OK Cancel





KEIL µVision

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



- 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:>\sw-examples\mb9bf56xr_gpio-v11\example\ARM\
 - Choose mb9bf56xr_gpio.uvproj

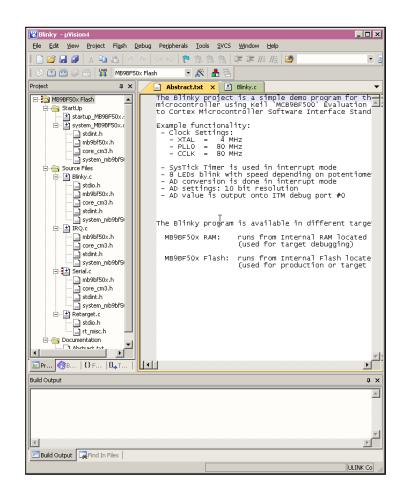
Blinky - µVision4		
	I Perjipherals <u>T</u> ools <u>S</u> VCS <u>Wi</u> ndow <u>H</u> elp	
I 🗋 😂 🛃 🗿 🕹 🖬 🕵 🧐 🤊		
🔗 🎬 🎬 🥔 🔜 🙀 MB9BF50x Fla		
Project a X	Abstract.txt X Blinky.c	•
MB9BF50x Flash	The Blinky project is a simple demo program for the Fujitsu 'MB9BF506'	
E StartUp	microcontroller using Keil 'MCB9BF500' Evaluation Board, compliant to Cortex Microcontroller Software Interface Standard (CMSIS v1.30).	<u>^</u>
startup_MB9BF50x.s		
⊡… 🔛 system_MB9BF50x.c	Example functionality: - Clock Settings:	
🔜 mb9bf50×.h	$- \times TAL = 4$ MHz - PLLO = 80 MHz	
core_cm3.h	- CCLK = 80 MHZ	
Source Files	 SysTick Timer is used in interrupt mode 8 LEDs blink_with speed depending on potentiometer position 	
🖻 🛗 Blinky.c	- AD conversion is done in interrupt mode	
🛄 mb9bf50×.h	 AD settings: 10 bit resolution AD value is output onto ITM debug port #0 	
core_cm3.h		
system_mb9bf50x.h	The Blinky program is available in different targets:	
IRQ.c		
mb9bf50x.h	MB9BF50x RAM: runs from Internal RAM located on chip (used for target debugging)	
🔜 stdint.h	MB9BF50x Flash: runs from Internal Flash located on chip	
system_mb9bf50x.h	(used for production or target debugging)	
mb9bf50x.h		-
EProj Hooks {} Fun 0, Tem		▶
Build Output		ą ×
		-
		-
<u> </u>		Þ
🖅 Build Output 🔤 Find In Files		
	ULINK Cortex Debugger L:1 C:71	CAI //



KEIL µVision – Main Window

KEIL µVision

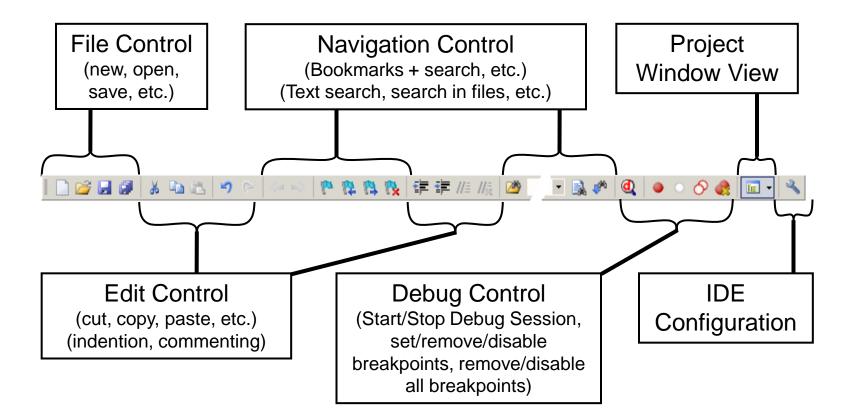
- Project window on left side of IDE window
 - Choose:
 View→Project Window
 if hidden
- Source files on right side of IDE window as tabbed windows
- Output window on bottom side of IDE window





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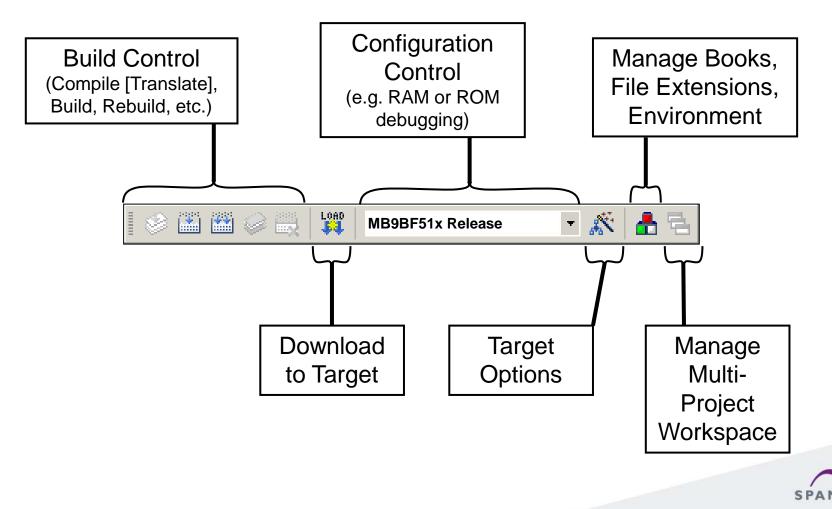
- Menu Bar 1
 - Can be moved in bar window area or set floating



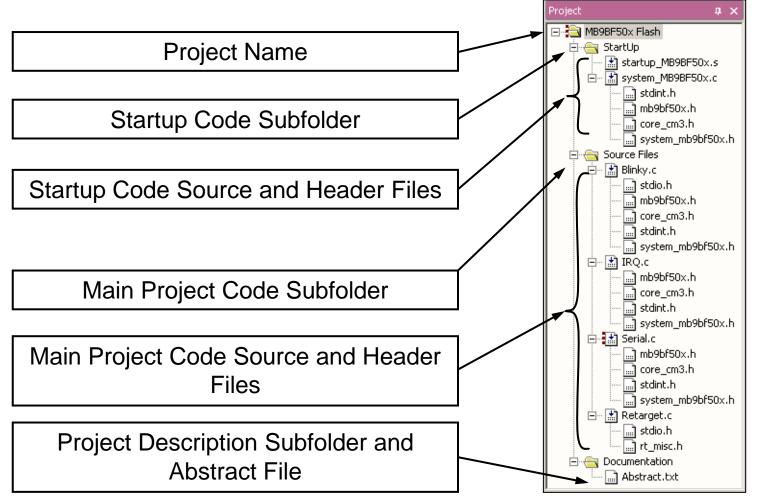


Menu Bar 2

- Can be moved in bar window area or set floating









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

Build Output					
	et 'MB9BF50x Flash' startup MB9BF50x.s				
-	system_MB9BF50x.c				
	compiling Blinky.c				
	compiling IRQ.c "V compiling Serial.c				
	compiling Retarget.c				
linking Program Size: Code=2604 RO-data=320 RW-data=32 ZI-data=512					
".\Flash\Blinky.axf" - O Error(s), O Warning(s).					
र					
📰 Build Output	🗔 Find In Files				

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

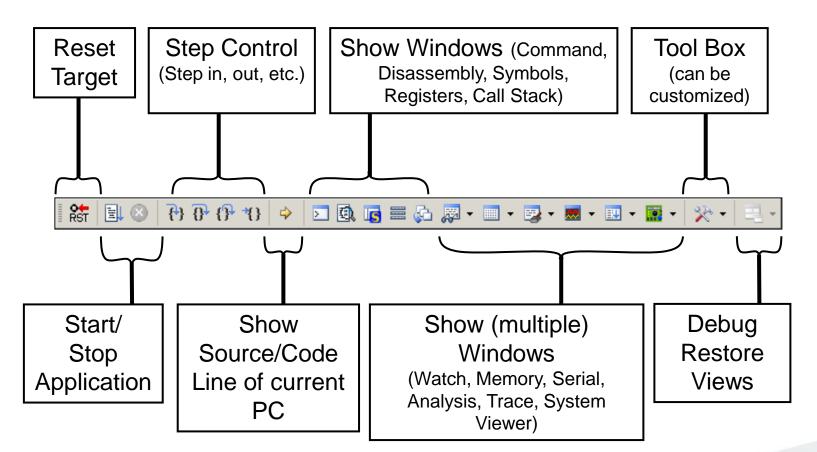
Build Output	▼ 104 TYPO while (1) { 105	/* Loop forever
compiling Blinky.c Blinky.c(104): error: Blinky.c: TYPO while Blinky.c: ^	#20: identifier "TYPO" is undefined .e (1) { /3	* Loop forever *,



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

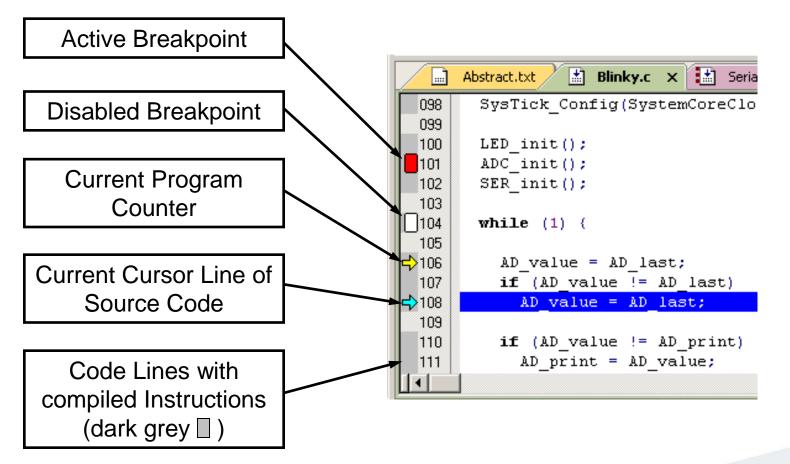


- Debugging Icon Bar
 - During a Debug Session there will be visible a new icon bar



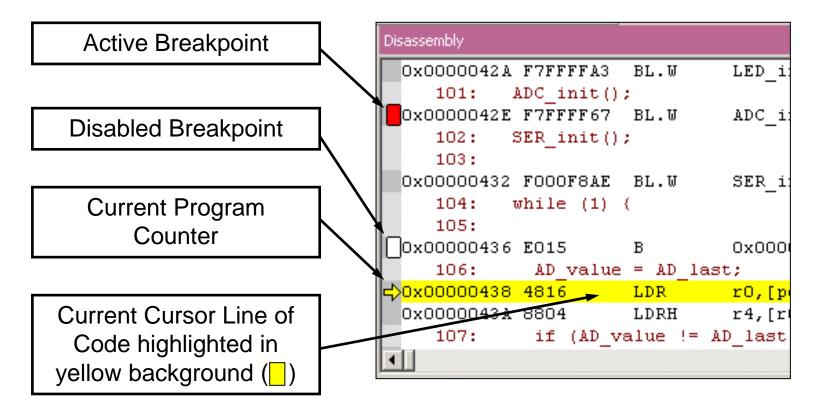


- Source View
 - The Source windows do not change contents but get additional information





- Disassembly View
 - Mixed mode is selectable and deselectable





- 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

Memory 1																ф ×
Address: 0x2000	0004															
0x20000004:	34	12	00	00	00	00	00	00	00	00	00	00	01	00	00	00
0x20000014:	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0x20000024:	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0x20000034:	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00 🚽
Watch 1	Memo	ory 1	ſ													

- 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

Register	Value
	Value
BO	0x000003F5
	0x000003F5 0x20000220
B2	0x20000220 0x00000000
B3	0x000006A1
B4	0x000008AT
R4	0x0000086C
B6	0x0000000
B7	0x00000000
	0x00000000
B9	0x00000000
	0x00000000
	0x00000000
	0x00000000
R13 (SP)	
± ∽ xPSR	0x61000000
🗄 Banked	
⊞····· System	
internal	
Mode	Thread
Privilege	Privileged
Stack	MSP
States	2974522
Sec	0.03718153



- Variable Windows
 - Watch Windows

Watch 1	# ×
Name	Value
\Blinky\AD_dbg	0x01EA
<pre>double-click or F2 to add></pre>	
BLocals Watch 1 Memory 1	

- 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

Locals	1	φ×
Name	Value	
AD_value	0x01EA	_
AD_print	0x01EA	
Line ticks	<out ot="" scope=""></out>	
Barrier Memory 1		

- 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



- Trace via ITM
 - Simple Trace views via Instrumentation Trace Macro is supported by $\mu\text{LINK}\ \text{ME}$
 - Records
 - Exceptions

٠	Counters
---	----------

race Reco	ords							×
Туре	Ovf Num	Address	Data	PC	Dly	Cycles	Time[s]	
ITM	0		41H			82975148	1.03718935	
ІТМ	0		44H			82975293	1.03719116	
ІТМ	0		20H		X	82988592	1.03735740	
ІТМ	0		76H		×	82988592	1.03735740	
ITM	n – – – – – – – – – – – – – – – – – – –	1	61H		X	82988592	1.03735740	
TTM V	 Counter Events 		6CH		X	82988592	1.03735740	
ITM	 Exceptions 		75H		X	82988592	1.03735740	
ITM	✓ PC Samples		65H		X	82988592	1.03735740	
ITM	✓ ITM Events		20H		X	82988592	1.03735740	
ITM	• • • • • • • • • • • • • • • • • • • •		3DH		X	82988592	1.03735740	
ITM	✓ Data Reads		20H		X	82988592	1.03735740	
ITM	🖌 Data Writes		30H		X	82988592	1.03735740	
ITM (U		78H		X	82988592	1.03735740	
ITM	0		30H			82993831	1.03742289	
ITM	0		31H		X	83001392	1.03751740	
ITM	0		45H		X	83001392	1.03751740	
ITM	0		42H		×	83001392	1.03751740	
ITM	0		0DH		×	83001392	1.03751740	
ITM	0		QAH		×	83001392	1.03751740	
ITM	0		0DH		×	83001392	1.03751740	-



Trace via ETM

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

Options for Target 'MB9BF50x Flash'	×	
Device Target Output Listing User C/C++ Asm	Linker Debug Utilities	
C Use Simulator Settings	See: ULINK Pro Cortex Debugger Settings	
✓ Load Application at Startup ✓ Run to main() Initialization File:	Load Application at Startup Run to main() Initialization Frie.	
Edit	.\ETM_Trace_enable.ini	
Restore Debug Session Settings	Restore Debug Session Settings	📙 ETM_Trace_enable.ini - Notepad
Breakpoints Toolbox Watch Windows & Performance Analyzer	Breakpoints Toolbox Watch Windows	<u>File Edit Fo</u> rmat <u>V</u> iew <u>H</u> elp
Memory Display	Memory Display	LwDword(0x40033000, 0x00003FF); LwBYTE(0x40033603,0x03);
CPU DLL: Parameter:	Driver DLL: Parameter:	
SARMCM3.DLL -MPU	SARMCM3.DLL -MPU	enables ETM pins
		enables E nin pins
Dialog DLL: Parameter:	Dialog DLL: Parameter:	
DCM.DLL -pCM3	TCM.DLL -pCM3	
OK Ca	ncel Defaults Help	



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

Instruction Tra	ice										ą	ιx
Filter: All				-								-
#	Туре	Flag	Num	PC	Opcode	Instruct	ion	Source	Code			
1048564	ETM			0x0000043E	4284	CMP	r4,r0					
1048565	ETM			0x00000440	D001	BEQ	0x00000446					
1048566	ETM			0x00000446	42AC	CMP	r4,r5	111:	if (AD_value !=	AD_print) {	/* Make sure that AD inte	er
1048567	ETM			0x00000448	D002	BEQ	0x00000450					
1048568	ETM			0x00000450	4814	LDR	r0,[pc,#80] ; @0x000004A4	116:	if (clock_1s) {			
1048569	ETM			0x00000452	7800	LDRB	[00x0#,01],01					
												-
📩 Blin	ky.c X		Abstract.	txt 🛄 st	dio.h							•
108	if (Al	_val	ue !=	AD_last)		1	* Make sure that AD	inter.	rupt did	*/		•
109 110	AD_v	/alue	= AD	_last;		/	* not interfere with	n valu	e reading	*/		
->111	if (Al	val	ue !=	AD print) (1	* Make sure that AD	inter.	rupt did	*/		
112 113	_			_value; _value;		/	* Get unscaled value	e for ;	printout	*/		-
											Þ]



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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

Options for Target 'MB9BF50x Flash'	×
Device Target Outpu Listing User C/C++ Asm	Linker Debug Utilities
Use Simulator Settings Limit Speed to Real-Time	C Use: ULINK Pro Cortex Debugger 💌 Settings
Load Application at Startup Initialization File: Restore Debug Session Settings Breakpoints Breakpoints Watch Windows & Performance Analyzer Memory Display	✓ Load Application at Startup ✓ Run to main() Initialization File: .XETM_Trace_enable.ini Restore Debug Session Settings ✓ Breakpoints ✓ Toolbox ✓ Watch Windows ✓ Memory Display
CPU DLL: Parameter: SARMCM3.DLL MPU	Driver DLL: Parameter: SARMCM3.DLL MPU
Dialog DLL: Parameter: DCM.DLL -pCM3	Dialog DLL: Parameter: TCM.DLL -pCM3
OK Car	ncel Defaults Help



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Finally

Workshops & Seminars

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FM Seminar	Motor Control	USB Workshop	Ethernet Workshop
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 Project setup/modification Debugging External interrupts 	 Hands-on exercise / SW-Example BLDC motor with hall sensor PMSM motor with field orientated control 	 PC software based on LibUSB Special Use Cases e.g. boot loader 	• Hands-on training



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- America: <u>Spansion.Solutions@Spansion.com</u>
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