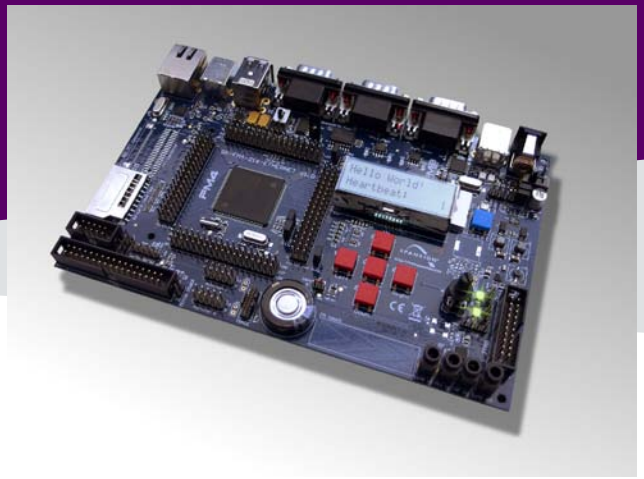
SK-FM4-216-ETHERNET

Hardware V1.0 / Documentation V1.3



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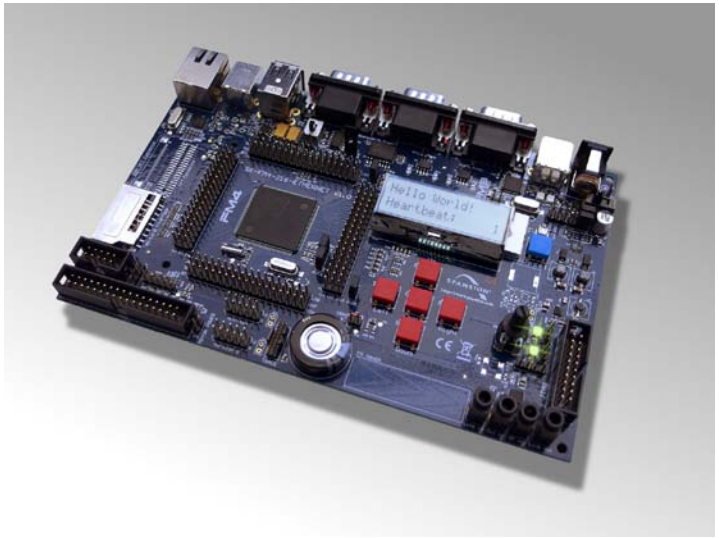
This board and its deliverables must only be used for test applications in an evaluation laboratory environment.

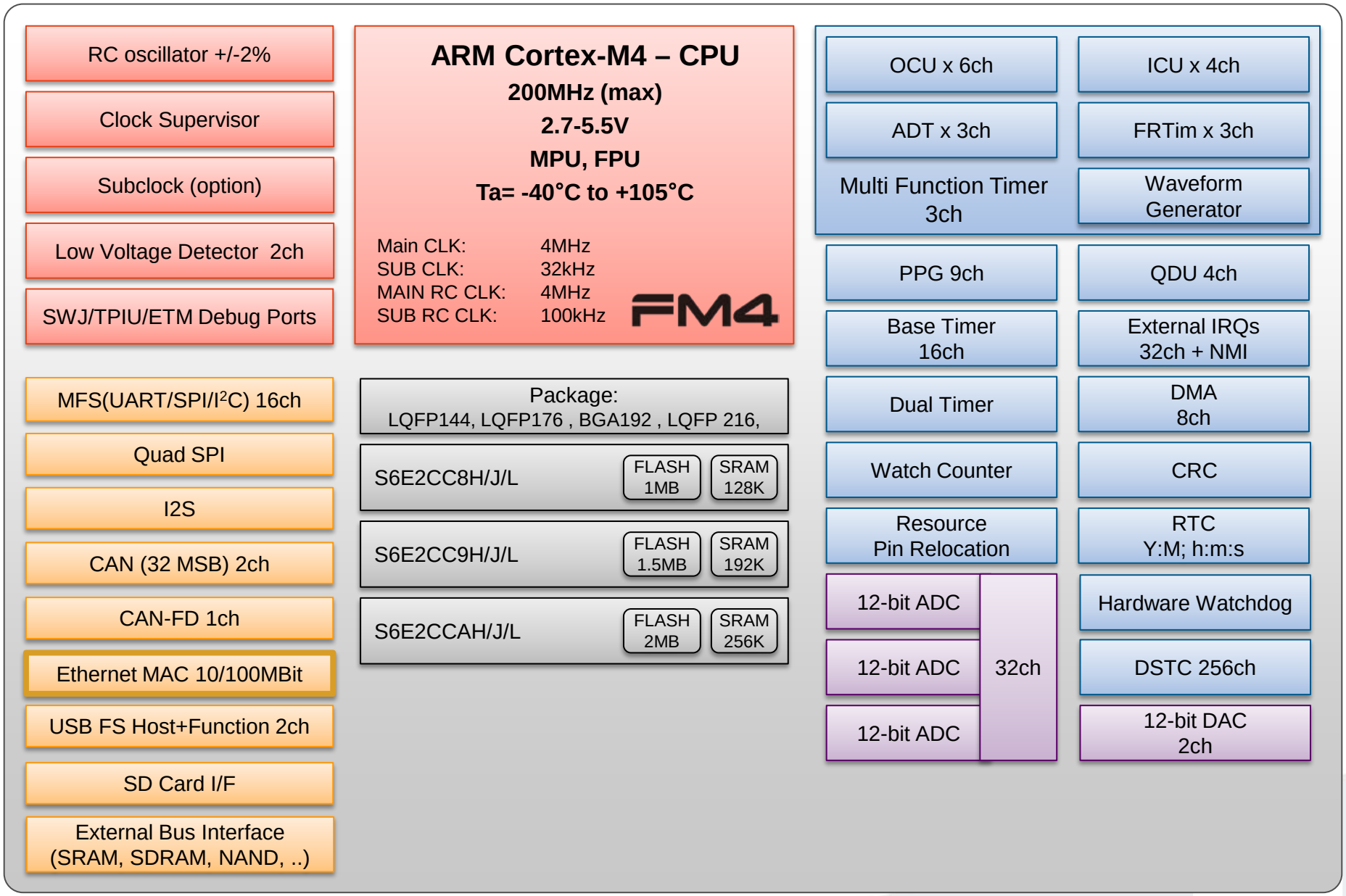
Overview

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



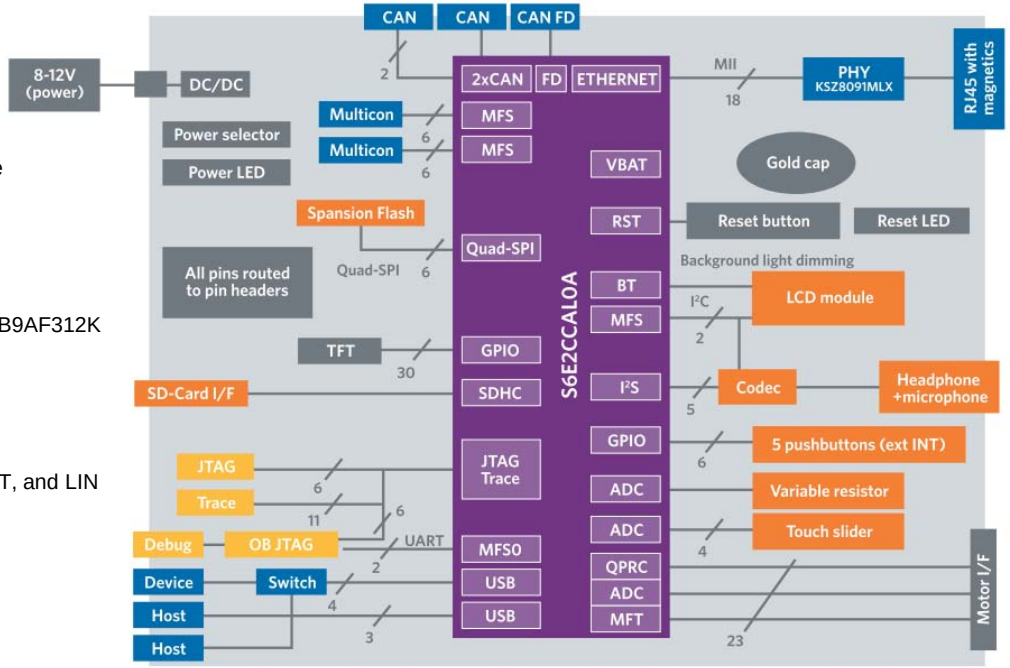
- **Additional documents**
  - Schematics
  - Data sheet S6E2CC Series
    - Peripheral Manual
      - Timer part
      - Analog part
      - Communication part
      - Ethernet part
    - Flash programming manual

Features of the S6E2CC Microcontroller



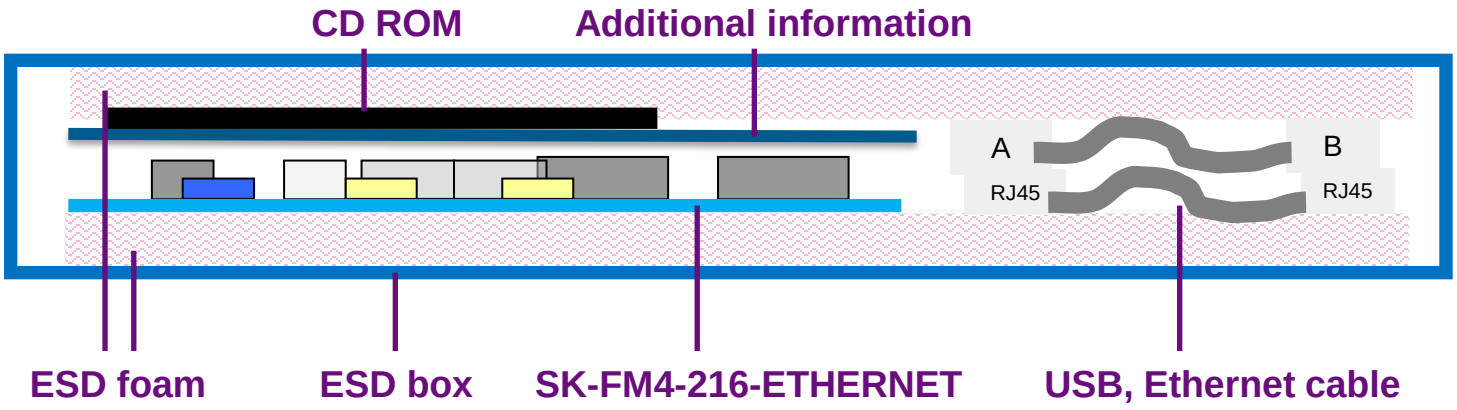
Features of the board

- Features of the SK-FM4-216-ETHERNET board:
  - Microcontroller Spansion FM4 S6E2CCAL0A
  - FM *connect* Ethernet: 1x IEEE802.3 Ethernet
  - FM *connect* CAN: 2x CAN transceiver + 1x CAN-FD transceiver
  - FM *connect* USB: 2x USB-Host (Type-A connector), 1x USB-Device (Type-B connector)
  - FM *touch*: Slider using four ADC channels
  - FM *inverter*: Motor-Control-Interface for e.g. SK-POWER-3P-LV2-MC
  - FM *color*: Spansion S/W TFT interface
  - Spansion flash memory S25FL164K, connected via quad SPI interface
  - I²S audio interface
  - SD Card interface
  - 1x USB-to-serial converter (Type-B connector) using Spansion FM3 MB9AF312K
    - UART and on-board JTAG simultaneously (CMSIS DAP)
  - Additional JTAG and Trace Interfaces each on a 20 pin-header
  - 2x Spansion *Multicon* flexible serial interface supporting I²C, SPI, UART, and LIN
  - User interface
    - Backlit LCD module
    - 5x pushbuttons (*User* buttons), potentiometer
    - 1x *Reset*-button, *Reset*-LED
  - All 216 pins routed to pin-header
  - On-board 5V and 3V voltage regulators to supply MCU with separate *Power*-LEDs
  - 4x Power supply options: USB, USB-Device, JTAG or external 9V to 24V



Contents SK-FM4-216-ETHERNET

- The SK-FM4-216-ETHERNET box contains
  - The SK-FM4-216-ETHERNET evaluation board
  - USB cable
  - Ethernet cable
  - CD: Documentation, software examples and development utilities
  - 1-page flyer



Test it

- The microcontroller on the SK-FM4-216-ETHERNET
  is already preprogrammed with an example application (<drive:>\Examples\sk-fm4-216-ethernet-tp_v12.srec).
  - Verify that jumpers JP75 and JP77 are set to 1-2 position and jumper JP76 is set to 3-4 position
  - Connect the SK-FM4-216-ETHERNET via DEBUG USB port (X2) with the PC
  - Verify that switch S1 is set to *RUN*
  - Press the *Reset*-button
  - The SK-FM4-216-ETHERNET‘s display will show a greeting message
  - Using the Up and Down pushbuttons will scroll through a menu on the LCD module
- Connect X3 (static IP address 192.168.1.20) to a PC or local area network
  - Configure your PC to an untaken IP address within the same subnet (such as 192.168.1.42)
  - Point your webbrowser to board‘s IP address (192.168.1.20)
- Install the USB Driver first <drive:>\drivers\driverinstaller.exe
  - Check the availibility for virtual COM port e.g. with Windows Device Manager
  - Open a serial terminal tool
  - e.g. Spansion Serial Port Viewer
    <drive:>\tools\serialportviewer\setup.exe
  - Settings 115200 baud, 8N1
  - More board tests are available via serial console

Test it

- You finished successfully the first tests

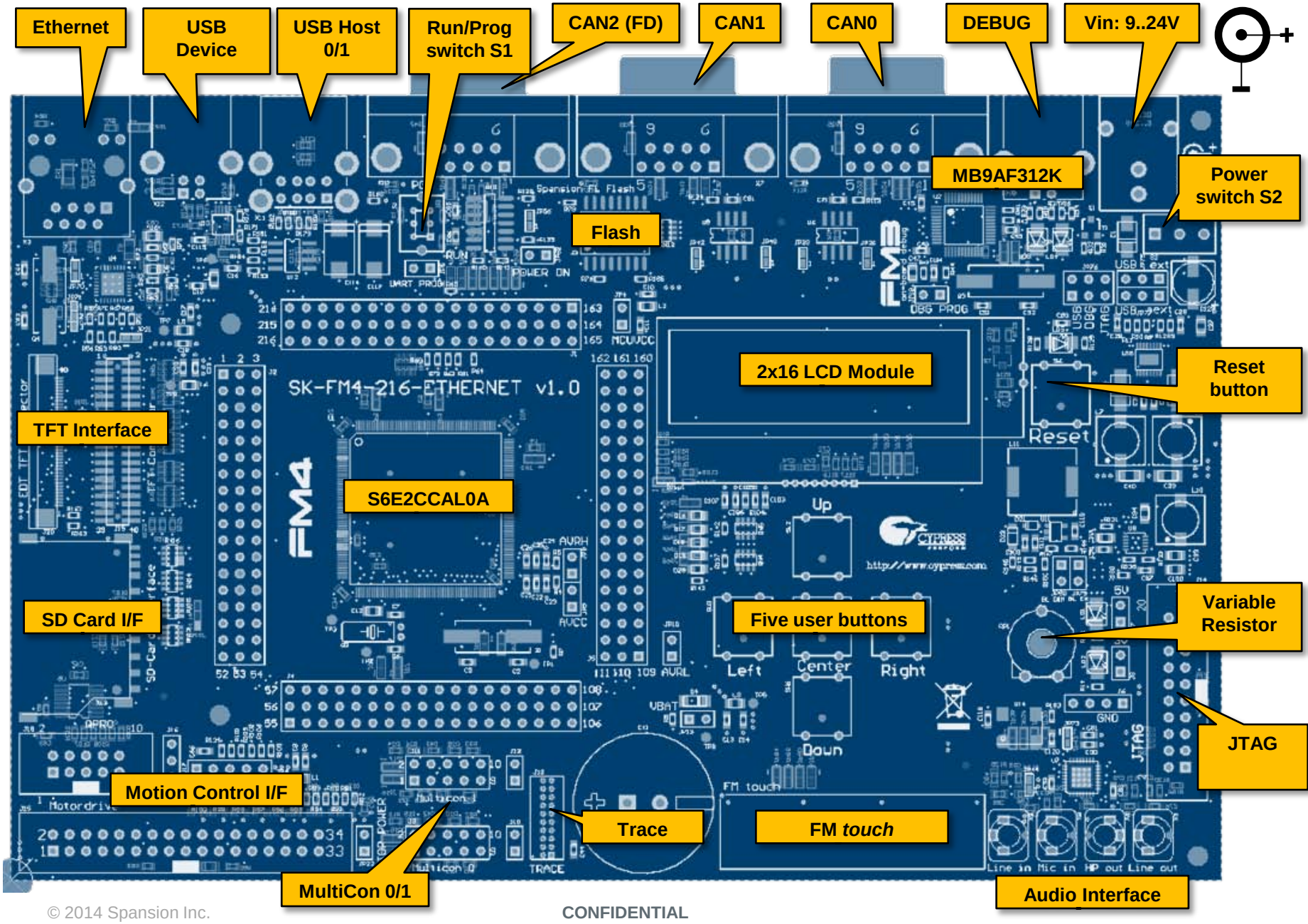
Congratulations!

- Now you will get more details about the SK-FM4-216-ETHERNET

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

Hardware

The Hardware (Top Side) – Function Overview

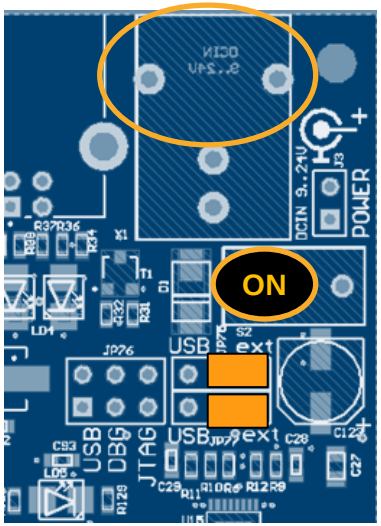


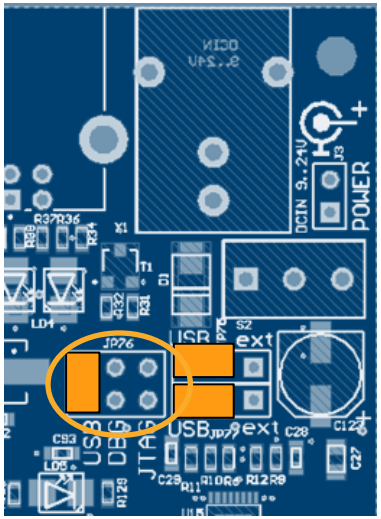
Jumper Settings – Power the starterkit

- The starter kit can be powered by
  - External power supply (9-24V)
    - Set jumpers JP75 and JP77 to position 1-2
      - Caution: Always set JP75 and JP77 horizontally, never vertically!
    - Connect X1 to 8..24V DC power
    - Switch S2 into ON position
  - USB
    - There are three ways to power the starter kit via USB
    - Set jumpers JP75 and JP77 to position 2-3
    - Set jumper JP76 according to the desired power source:

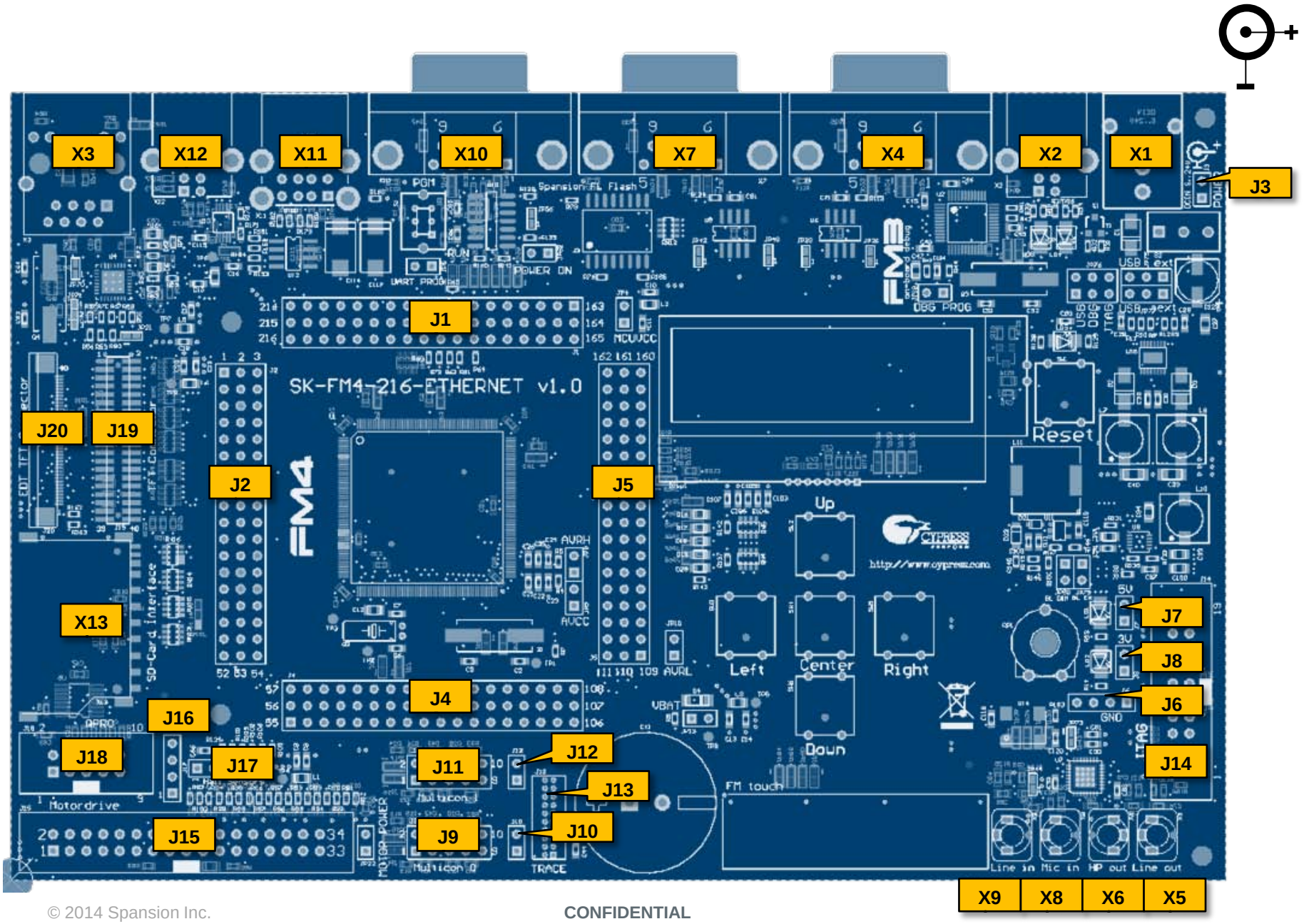
JP76	Power source	Connector
1-2	USB Device	X12
3-4	DEBUG	X2
5-6	JTAG (ensure that adapter can provide enough current for your application! Some JTAG probes source insufficient power and some features might misbehave unexpectedly)	J14

  - For CAN2 (CAN FD), external power supply must be used, not USB





The Hardware – Connectors

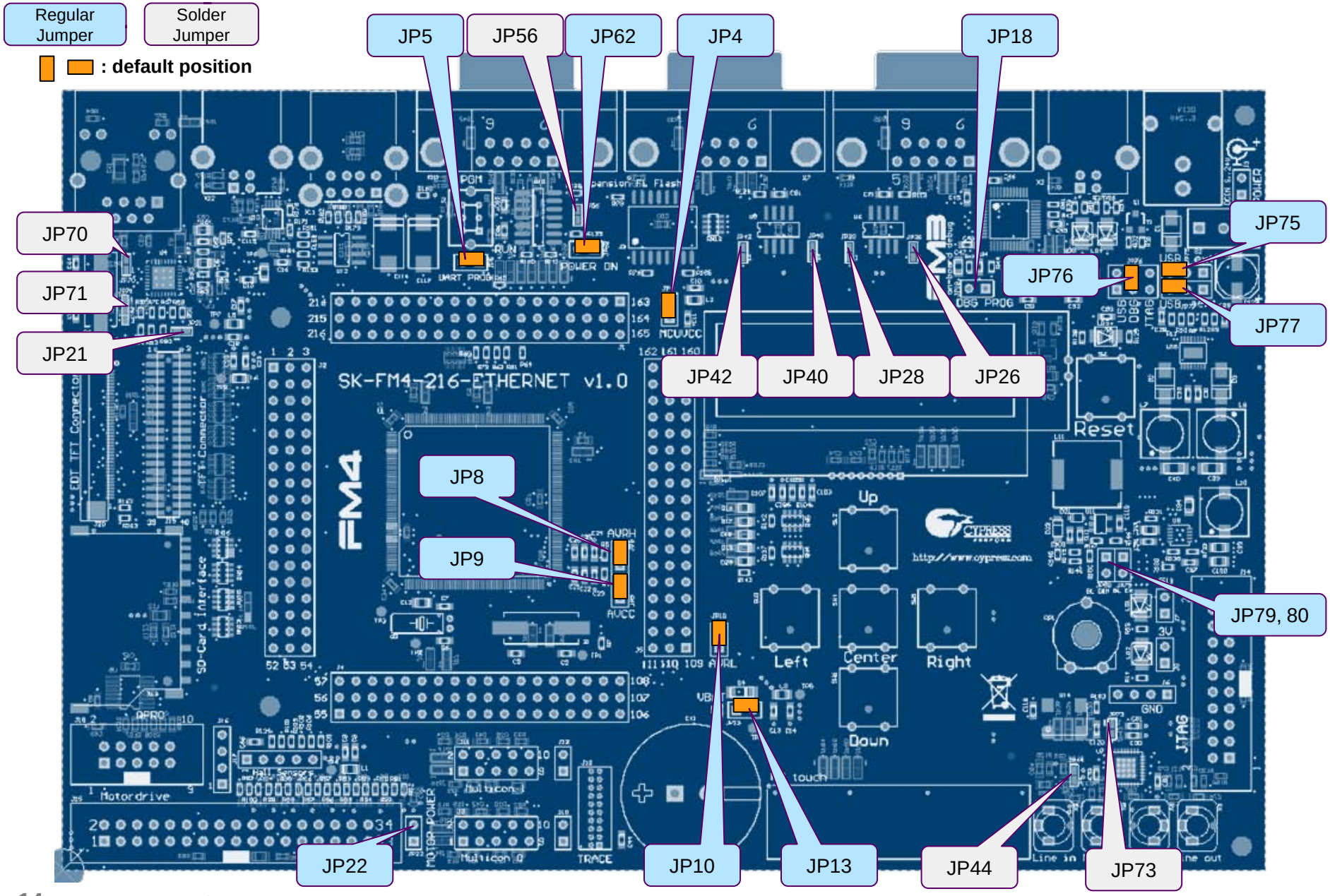


Connectors SK-FM4-216-ETHERNET

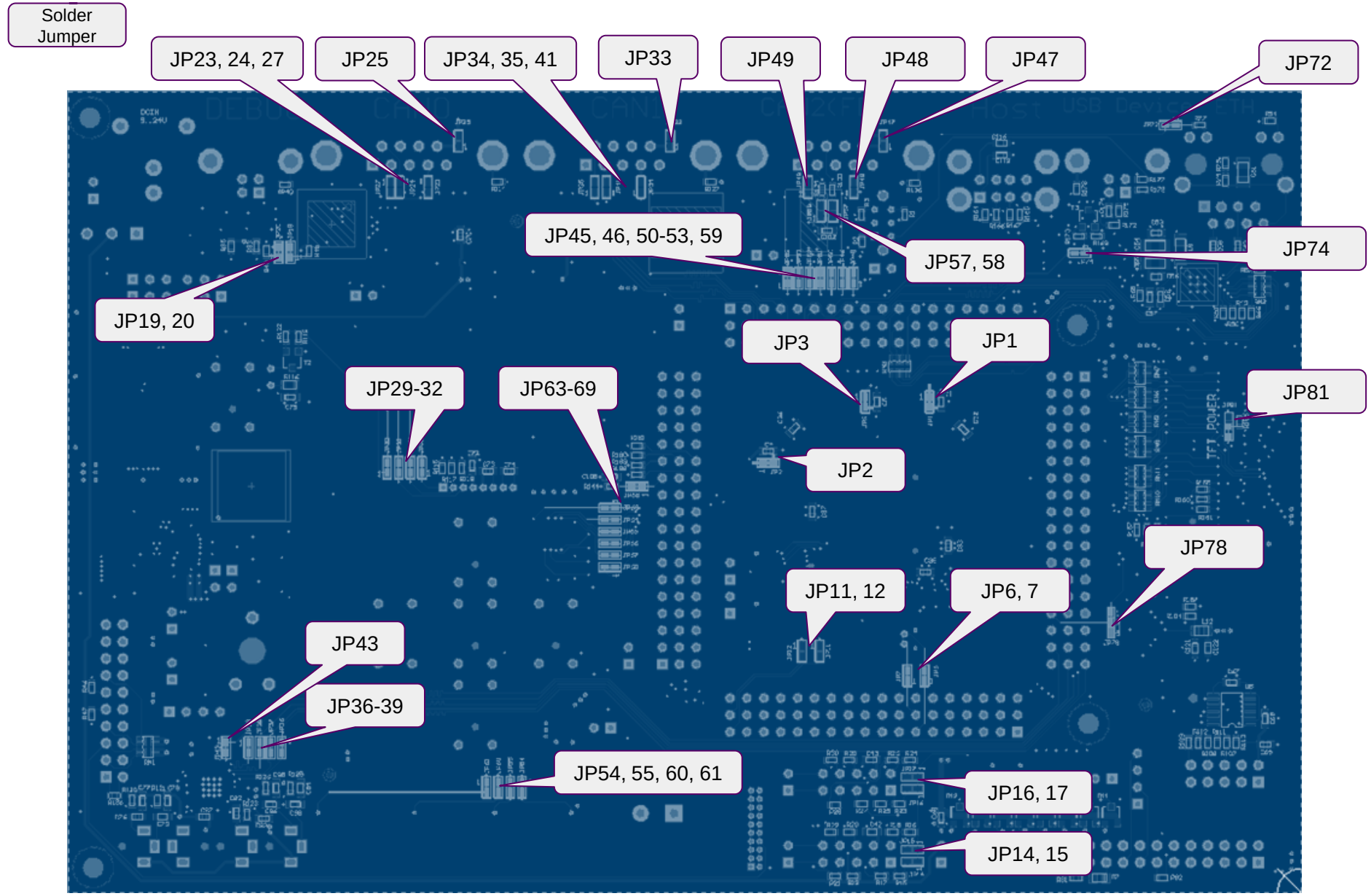
Number	Description
J1	MCU pins 163..216
J2	MCU pins 1..54
J3	VCCin (1: before switch, 2: after switch)
J4	MCU pins 55..108
J5	MCU pins 109..162
J6	4x GND
J7	2x 5V
J8	2x 3V3
J9	Multicon 0
[J10]	Multicon 0 optional
J11	Multicon 1
[J12]	Multicon 1 optional
J13	Trace
J14	JTAG
J15	Motor drive interface
J16	Motor I/F: Optional signals
J17	Hall Sensors
J18	QPRC
[J19]	Display RGB888 connector
[J20]	FPC/FCC connector

Number	Description
X1	DCin 9..24V
X2	Debug
X3	Ethernet
X4	CAN0
X5	Audio line out
X6	Audio headphones out
X7	CAN1
X8	Audio microphone in
X9	Audio line in
X10	CAN2 (CAN FD)
X11	USB Host (0/1)
X12	USB Device
X13	SD Card Connector

Jumper Settings – (Top Side)



Jumper Settings – (Bottom Side)



Jumper Settings SK-FM4-216-ETHERNET

Number	Description	Special Type	Default
JP1	USBVCC0	Solder Jumper	Closed
JP2	USBVCC1	Solder Jumper	Closed
JP3	ETHVCC	Solder Jumper	Closed
JP4	MCUVCC		Closed
JP5	USB/UART programming		Closed
JP6	X0A Access	Solder Jumper	Closed
JP7	X1A Access	Solder Jumper	Closed
JP8	AVRH		Closed
JP9	AVCC		Closed
JP10	AVRL		Closed
JP11	X0 Access	Solder Jumper	Open
JP12	X1 Access	Solder Jumper	Open
JP13	VBAT		Closed
JP14	Multicon0: SCL pull-up	Solder Jumper	Open
JP15	Multicon0: SDA pull-up	Solder Jumper	Open
JP16	Multicon1: SCL pull-up	Solder Jumper	Open
JP17	Multicon1: SDA pull-up	Solder Jumper	Open
JP18	DBG Prog (S/W upgrade U2)		Open

Number	Description	Special Type	Default
JP19	MFS0_SOT	Solder Jumper	Closed
JP20	MFS0_SIN	Solder Jumper	Closed
JP21	EthPHY IRQ	Solder Jumper	Closed
JP22	Supply VCCin from motor		Open
JP23	CAN0GND4	Solder Jumper	Open
JP24	CAN0GND6	Solder Jumper	Open
JP25	CAN0pwr	Solder Jumper	Open
JP26	CAN0RX	Solder Jumper	Closed
JP27	CAN0term	Solder Jumper	Open
JP28	CAN0TX	Solder Jumper	Closed
JP29	LCDRST	Solder Jumper	Closed
JP30	HMISCL	Solder Jumper	Closed
JP31	HMISDA	Solder Jumper	Closed
JP32	LCDBL	Solder Jumper	Closed
JP33	CAN1pwr	Solder Jumper	Open
JP34	CAN1GND4	Solder Jumper	Open
JP35	CAN1GND6	Solder Jumper	Open
JP36	I2SDO	Solder Jumper	Closed

Jumper Settings SK-FM4-216-ETHERNET

Number	Description	Special Type	Default
JP37	I2SDI	Solder Jumper	Closed
JP38	I2SCK	Solder Jumper	Closed
JP39	I2SWS	Solder Jumper	Closed
JP40	CAN1RX	Solder Jumper	Closed
JP41	CAN1term	Solder Jumper	Open
JP42	CAN1TX	Solder Jumper	Closed
JP43	I2SMCLK	Solder Jumper	Closed
JP44	I2SAGND	Solder Jumper	Closed
JP45	CAN2RX	Solder Jumper	Closed
JP46	CAN2TX	Solder Jumper	Closed
JP47	CAN2pwr	Solder Jumper	Open
JP48	CAN2GND4	Solder Jumper	Open
JP49	CAN2GND6	Solder Jumper	Open
JP50	CAN2S	Solder Jumper	Closed
JP51	CAN2C	Solder Jumper	Closed
JP52	CAN2O	Solder Jumper	Closed
JP53	CAN2I	Solder Jumper	Closed
JP54	Touch AN24	Solder Jumper	Closed

Number	Description	Special Type	Default
JP55	Touch AN25	Solder Jumper	Closed
JP56	CANFDBAT	Solder Jumper	Closed
JP57	CAN2termH	Solder Jumper	Open
JP58	CAN2termL	Solder Jumper	Open
JP59	CAN2Wake	Solder Jumper	Closed
JP60	Touch AN26	Solder Jumper	Closed
JP61	Touch AN27	Solder Jumper	Closed
JP62	POWERON		Closed
JP63	Button UP	Solder Jumper	Closed
JP64	Button RIGHT	Solder Jumper	Closed
JP65	Button CENTER	Solder Jumper	Closed
JP66	Button LEFT	Solder Jumper	Closed
JP67	Button DOWN	Solder Jumper	Closed
JP68	Button IRQ	Solder Jumper	Closed
JP69	RP1	Solder Jumper	Closed
JP70	EthPHY XO	Solder Jumper	Closed
JP71	EthPHY XI	Solder Jumper	Closed
JP72	Ethernet Yellow LED	Solder Jumper	Closed

Jumper Settings SK-FM4-216-ETHERNET

Number	Description	Special Type	Default
JP73	I2S48.1k	Solder Jumper	Closed
JP74	USB HCONX	Solder Jumper	Closed
JP75	1-2: External power supply 2-3: Supply via USB or JTAG	JP75 must equal 77	1-2
JP76	1-2: USB Device (X11) 3-4: Debug port (X2) 5-6: JTAG (J11) (watch voltage!)	Only relevant if JP75 and JP77 set to 2-3	3-4
JP77	1-2: External power supply 2-3: Supply via USB or JTAG	JP75 must equal 77	1-2
JP78	SD_CD: 1-2: CD 2-3: CD/DAT3	Solder Jumper	1-2
[JP79]	Backlight enable		Open
[JP80]	Backlight dimming		Open
[JP81]	LCD power control		1-2

Pin-List SK-FM4-216-ETHERNET (3/9)

Pin	Function	Description
1	**VCC**	MCUVCC
2	**PA0**/RTO20_0/TIOA8_0/AIN2_0/INT00_0/MADATA00_0	Pushbutton UP
3	**PA1**/RTO21_0/TIOA9_0/BIN2_0/MADATA01_0	Pushbutton RIGHT
4	**PA2**/RTO22_0/TIOA10_0/ZIN2_0/MADATA02_0	Pushbutton CENTER
5	**PA3**/RTO23_0/TIOA11_0/MADATA03_0	Pushbutton LEFT
6	**PA4**/RTO24_0/TIOA12_0/MADATA04_0	Pushbutton DOWN
7	PA5/SIN1_0/RTO25_0/TIOA13_0/**INT01_0**/MADATA05_0	Pushbutton IRQ
8	PA6/SOT1_0/DTTI2X_0/MADATA06_0	
9	PA7/SCK1_0/IC20_0/MADATA07_0	
10	P50/SCS72_0/**RTO00_1**/TIOA8_2/MADATA16_0	Motor0/MFT0
11	P51/SCS73_0/**RTO01_1**/TIOB8_2/MADATA17_0	Motor0/MFT0
12	P52/**RTO02_1**/TIOA9_2/MADATA18_0	Motor0/MFT0
13	P53/**RTO03_1**/TIOB9_2/MADATA19_0	Motor0/MFT0
14	PA8/SIN7_0/IC21_0/**INT02_0**/**WKUP1**/MADATA08_0	Ethernet PHY IRQ
15	PA9/SOT7_0/IC22_0/MADATA09_0	
16	**PAA**/SCK7_0/IC23_0/MADATA10_0	USB (Host1 VBUS enable)
17	PAB/SCS70_0/RX0_0/FRCK2_0/**INT03_0**/MADATA11_0	USB1 Overcurrent IRQ
18	PAC/SCS71_0/TX0_0/**TIOB8_0**/**AIN3_0**/MADATA12_0	Motor0/QPRC3
19	P54/SIN15_1/**RTO04_1**/TIOA10_2/INT00_2/MADATA20_0	Motor0/MFT0
20	P55/SOT15_1/**RTO05_1**/TIOB10_2/MADATA21_0	Motor0/MFT0
21	P56/SCK15_1/**DTTI0X_1**/TIOB0_1/MADATA22_0	Motor0/MFT0
22	P57/**IC00_1**/TIOB1_1/MADATA23_0	Motor0/IC0
23	PAD/SCK3_0/TIOB9_0/**BIN3_0**/MADATA13_0	Motor0/QPRC3
24	PAE/ADTG_0/SOT3_0/TIOB10_0/**ZIN3_0**/MADATA14_0	Motor0/QPRC3

Pin-List SK-FM4-216-ETHERNET (3/9)

Pin	Function	Description
25	PAF/SIN3_0/TIOB11_0/INT16_0/MADATA15_0	
26	P58/SIN11_1/**IC01_1**/TIOB2_1/INT02_2/MADATA24_0	Motor0/IC0
27	P59/SOT11_1/**IC02_1**/TIOB3_1/MADATA25_0	Motor0/IC0
28	P5A/SCK11_1/IC03_1/TIOB4_1/MADATA26_0	
29	P5B/FRCK0_1/TIOB5_1/MADATA27_0	
30	P08/SIN14_0/TIOB12_0/INT17_0/MDQM0_0	
31	P09/SOT14_0/TIOB13_0/INT18_0/MDQM1_0	
32	P0A/ADTG_1/SCK14_0/AIN2_1/MCLKOUT_0	
33	P5C/**TIOA11_2**/MADATA28_0/RTCCO_1/SUBOUT_1	Motor0 OPT1 (Brake)
34	P30/RX0_1/TIOA13_2/INT03_2/MDQM2_0/**I2SDI_0**	I2S serial receive data input pin
35	P31/TX0_1/TIOB13_2/MDQM3_0/**I2SCK_0**	I2S bit clock terminal
36	P32/BIN2_1/INT19_0/**S_DATA1_0**	SD I/F
37	P33/FRCK0_0/ZIN2_1/**S_DATA0_0**	SD I/F
38	P34/IC03_0/INT00_1/**S_CLK_0**	SD I/F
39	**VCC**	MCUVCC
40	**VSS**	GND
41	P35/IC02_0/INT01_1/**S_CMD_0**	SD I/F
42	P36/IC01_0/INT02_1/**S_DATA3_0**	SD I/F
43	P37/IC00_0/INT03_1/**S_DATA2_0**	SD I/F
44	P38/ADTG_2/DTTI0X_0/**S_WP_0**	SD I/F
45	P39/SIN2_1/RTO00_0/TIOA0_1/AIN3_1/INT16_1/**S_CD_0**/MAD24_0	SD I/F
46	P3A/SOT2_1/RTO01_0/TIOA1_1/BIN3_1/INT17_1/MAD23_0	
47	P3B/SCK2_1/RTO02_0/TIOA2_1/ZIN3_1/INT18_1/MAD22_0/MNALE_0	
48	P3C/SIN13_0/RTO03_0/TIOA3_1/INT19_1/MAD21_0/MNCLE_0	

Pin-List SK-FM4-216-ETHERNET (3/9)

Pin	Function	Description
49	P3D/SOT13_0/RTO04_0/TIOA4_1/MAD20_0/MNWEX_0	
50	P3E/SCK13_0/RTO05_0/TIOA5_1/MAD19_0/MNREX_0	
51	P5D/SIN10_1/TIOB11_2/INT01_2/MADATA29_0/**I2SMCLK_0**	I2S External clock terminal
52	P5E/SOT10_1/TIOA12_2/MADATA30_0/**I2SDO_0**	I2S serial transmit data output pin
53	P5F/SCK10_1/TIOB12_2/MADATA31_0/**I2SWS_0**	I2S frame sync signal terminal
54	**VSS**	GND
55	**VCC**	MCUVCC
56	P40/SIN3_1/RTO10_0/**TIOA0_0**/AIN0_0/INT23_0/MCSX7_0	TFT Connector (CSYNC)
57	P41/SOT3_1/RTO11_0/**TIOA1_0**/BIN0_0/MCSX6_0	TFT Connector (DE)
58	P42/SCK3_1/RTO12_0/**TIOA2_0**/ZIN0_0/MCSX5_0	TFT Connector (DCLK)
59	P43/SIN15_0/RTO13_0/**TIOA3_0**/INT04_0/MCSX4_0	TFT Connector (VSYNC)
60	P44/SOT15_0/RTO14_0/**TIOA4_0**/MCSX3_0	TFT Connector (HSYNC)
61	P45/SCK15_0/RTO15_0/**TIOA5_0**/MCSX2_0	TFT Connector (LEDCTRL)
62	**C**	C
63	**VSS**	GND
64	**VCC**	MCUVCC
65	P4A/**SIN12_1**/AIN0_1/INT04_2	CAN FD control SPI
66	P4B/**SOT12_1**/BIN0_1	CAN FD control SPI
67	P4C/**SCK12_1**/ZIN0_1	CAN FD control SPI
68	P4D/SCS72_1/**RX2_2**/INT05_2	CAN2 (CAN-FD)
69	P4E/SCS73_1/**TX2_2**	CAN2 (CAN-FD)
70	**P7D**/SCK1_1/RX2_0/DTTI1X_0/INT05_0/WKUP2/MCSX1_0	CAN FD Wake
71	**P7E**/ADTG_7/TX2_0/FRCK1_0/MCSX0_0	CAN FD control SPI
72	**INITX**	Reset

Pin-List SK-FM4-216-ETHERNET (4/9)

Pin	Function	Description
73	P46/**X0A**	[Crystal (Subclock)]
74	P47/**X1A**	[Crystal (Subclock)]
75	**VBAT**	VBAT
76	P48/VREGCTL	
77	P49/VWAKEUP	
78	PF0/SCS63_0/RX2_1/FRCK1_1/TIOA15_1/INT22_1	
79	PF1/SCS62_0/TX2_1/TIOB15_1/INT23_1	
80	P70/ADTG_8/SIN1_1/INT06_0/MRDY_0/CEC0_0	
81	P71/SOT1_1/MAD00_0	
82	P72/SIN9_0/TIOB0_0/INT07_0/MAD01_0	
83	P73/SOT9_0/TIOB1_0/MAD02_0	
84	P74/SCK9_0/TIOB2_0/MAD03_0	
85	PF2/RTO10_1/TIOA6_1/MRASX_0	
86	PF3/RTO11_1/TIOB6_1/INT05_1/MCASX_0	
87	PF4/RTO12_1/TIOA7_1/INT06_1/MSDWEX_0	
88	**PF5**/RTO13_1/TIOB7_1/INT07_1/MCSX8_0	Multicon0 Reset
89	PF6/RTO14_1/TIOA14_1/**INT20_1**/MSDCKE_0	Multicon0 (GINT)
90	PF7/RTO15_1/TIOB14_1/**INT21_1**/MSDCLK_0	Multicon0 (TINT)
91	P75/**SIN8_0**/TIOB3_0/AIN1_0/INT20_0/MAD04_0	Multicon0
92	P76/**SOT8_0**/TIOB4_0/BIN1_0/MAD05_0	Multicon0
93	P77/**SCK8_0**/TIOB5_0/ZIN1_0/MAD06_0	Multicon0
94	PF8/SCS70_1/DTTI1X_1/AIN1_1	
95	PF9/SCS71_1/IC10_1/BIN1_1	
96	P78/SIN6_0/IC10_0/INT21_0/MAD07_0	

Pin-List SK-FM4-216-ETHERNET (5/9)

Pin	Function	Description
97	P79/SOT6_0/IC11_0/MAD08_0	
98	P7A/SCK6_0/IC12_0/MAD09_0	
99	P7B/DA1/SCS60_0/IC13_0/INT22_0	---
100	P7C/DA0/SCS61_0/INT04_1	---
101	PFA/SCK7_1/IC11_1/ZIN1_1	
102	PFB/SOT7_1/IC12_1/INT07_2	
103	PFC/SIN7_1/IC13_1/INT06_2	
104	PE0/**MD1**	MD1
105	**MD0**	MD0/ USB Direct Flash
106	PE2/**X0**	Crystal (mainclock)
107	PE3/**X1**	Crystal (mainclock)
108	**VSS**	GND
109	**VCC**	MCUVCC
110	**AVCC**	AVCC
111	**AVSS**	AVSS
112	**AVRL**	AVRL
113	**AVRH**	AVRH
114	P10/**AN00**/SIN10_0/TIOA0_2/AIN0_2/INT08_0	Motor0/ADC
115	P11/**AN01**/SOT10_0/TIOB0_2/BIN0_2	Motor0/ADC
116	P12/**AN02**/SCK10_0/TIOA1_2/ZIN0_2	Motor0/ADC
117	P13/**AN03**/SIN6_1/RX1_1/INT25_1	Motor0/ADC
118	P14/**AN04**/SOT6_1/TX1_1	Motor0/ADC
119	**PB8**/ADTG_6/SCS63_1/INT08_2/TRACED8	TFT Connector
120	**PB9**/SIN9_1/AIN2_2/INT09_2/TRACED9	TFT Connector

Pin-List SK-FM4-216-ETHERNET (6/9)

Pin	Function	Description
121	**PBA**/SOT9_1/BIN2_2/TRACED10	TFT Connector
122	**PBB**/SCK9_1/ZIN2_2/TRACED11	TFT Connector
123	P15/**AN05**/SIN11_0/TIOB1_2/AIN1_2/INT09_0	Motor0/ADC
124	P16/**AN06**/SOT11_0/TIOA2_2/BIN1_2	Motor0/ADC
125	P17/**AN07**/SCK11_0/TIOB2_2/ZIN1_2	Motor0/ADC
126	**PB0**/AN16/SCK6_1/TIOA9_1	TFT Connector
127	**PB1**/AN17/SCS60_1/TIOB9_1/INT08_1	TFT Connector
128	**PB2**/AN18/SCS61_1/TIOA10_1/INT09_1	TFT Connector
129	**PB3**/AN19/SCS62_1/TIOB10_1	TFT Connector
130	P18/**AN08**/SIN2_0/TIOA3_2/INT10_0	Motor0/ADC
131	P19/AN09/SOT2_0/TIOB3_2/INT24_1/**TRACECLK**	TRACE
132	P1A/AN10/SCK2_0/TIOA4_2/**TRACED0**	TRACE
133	P1B/AN11/SIN12_0/TIOB4_2/INT11_0/**TRACED1**	TRACE
134	P1C/AN12/SOT12_0/TIOA5_2/**TRACED2**	TRACE
135	P1D/AN13/SCK12_0/TIOB5_2/**TRACED3**	TRACE
136	**VSS**	GND
137	**VCC**	MCUVCC
138	**PB4**/AN20/SIN8_1/TIOA11_1/INT10_1/TRACED4	TFT Connector
139	**PB5**/AN21/SOT8_1/TIOB11_1/INT11_1/TRACED5	TFT Connector
140	**PB6**/AN22/SCK8_1/TIOA12_1/TRACED6	TFT Connector
141	**PB7**/AN23/TIOB12_1/TRACED7	TFT Connector
142	P1E/**AN14**/TIOA8_1/INT26_1/MAD10_0	Variable Resistor RP1
143	P1F/AN15/RTS5_0/TIOB8_1/INT27_1/MAD11_0	
144	P2A/**AN24**/CTS5_0/MAD12_0	Software Touch

Pin-List SK-FM4-216-ETHERNET (7/9)

Pin	Function	Description
145	P29/**AN25**/SCK5_0/MAD13_0	Software Touch
146	P28/**AN26**/SOT5_0/MAD14_0	Software Touch
147	P27/**AN27**/SIN5_0/INT24_0/MAD15_0	Software Touch
148	**PBC**/TX1_2/TRACED12	TFT Connector
149	**PBD**/SCK0_1/RX1_2/AIN3_2/INT10_2/TRACED13	TFT Connector
150	**PBE**/SOT0_1/BIN3_2/TRACED14	TFT Connector
151	**PBF**/SIN0_1/ZIN3_2/INT11_2/TRACED15	TFT Connector
152	P26/**TX1_0**/MAD16_0	CAN1
153	P25/AN28/**RX1_0**/INT25_0/MAD17_0	CAN1
154	P24/AN29/**TIOA13_1**/MAD18_0	LCD Illumination Dimming
155	**P23**/UHCONX1/AN30/SCK0_0/TIOB13_1	LCD Reset
156	P22/AN31/**SOT0_0**/INT26_0	UART/(USB-serial)
157	P21/ADTG_4/**SIN0_0**/INT27_0/CROUT_0	UART/(USB-serial)
158	P20/NMIX/WKUP0	---
159	**USBVCC1**	USBVCC1
160	P82/**UDM1**	USB
161	P83/**UDP1**	USB
162	**VSS**	GND
163	**VCC**	MCUVCC
164	P00/**TRSTX**	JTAG
165	P01/**TCK**/SWCLK	JTAG
166	P02/**TDI**	JTAG
167	P03/**TMS**/SWDIO	JTAG
168	P04/**TDO**/SWO	JTAG

Pin-List SK-FM4-216-ETHERNET (8/9)

Pin	Function	Description
169	P90/INT12_1/**Q_IO3_0**	QSPI Memory
170	P91/SIN5_1/INT13_1/**Q_IO2_0**	QSPI Memory
171	P92/SOT5_1/INT14_1/**Q_IO1_0**	QSPI Memory
172	P93/SCK5_1/INT15_1/**Q_IO0_0**	QSPI Memory
173	P94/CTS5_1/**Q_SCK_0**	QSPI Memory
174	P95/RTS5_1/**Q_CS0_0**	QSPI Memory
175	P96/**RX0_2**/INT12_2/Q_CS1_0	CAN0
176	P97/**TX0_2**/INT13_2/Q_CS2_0	CAN0
177	PC0/**E_RXER**	Ethernet
178	PC1/TIOB6_0/**E_RX03**	Ethernet
179	PC2/TIOA6_0/**E_RX02**	Ethernet
180	PC3/TIOB7_0/**E_RX01**	Ethernet
181	PC4/TIOA7_0/**E_RX00**	Ethernet
182	PC5/TIOB14_0/**E_RXDV**	Ethernet
183	PC6/TIOA14_0/**E_MDIO**	Ethernet
184	PC7/INT13_0/**E_MDC**/CROUT_1	Ethernet
185	PC8/**E_RXCK_REFCK**	Ethernet
186	PC9/TIOB15_0/**E_COL**	Ethernet
187	PCA/TIOA15_0/**E_CRS**	Ethernet
188	**ETHVCC**	Ethernet
189	**VSS**	GND
190	PCB/INT28_0/**E_COUT**	Ethernet Clock Out Option

Pin-List SK-FM4-216-ETHERNET (9/9)

Pin	Function	Description
193	PCE/SIN4_1/INT15_0/**E_TX03**	Ethernet
194	PCF/RTS4_1/INT12_0/**E_TX02**	Ethernet
195	PD0/INT30_1/**E_TX01**	Ethernet
196	PD1/INT31_1/**E_TX00**	Ethernet
197	PD2/CTS4_1/FRCK2_1/**E_TXEN**	Ethernet
198	**P6E**/ADTG_5/SCK4_1/IC23_1/INT29_0/E_PPS	Yellow LED on Ethernet connector
199	P6D/**SCK14_1**/IC22_1/TIOB6_2	HMI SCL
200	P6C/**SOT14_1**/IC21_1/TIOA6_2	HMI SDA
201	P6B/SIN14_1/IC20_1/TIOB7_2/**INT14_2**	USB0 Overcurrent IRQ
202	**P6A**/DTTI2X_1/TIOA7_2	Ethernet PHY Reset
203	**P69**/RTO20_1/TIOB14_2	Multicon1 Reset
204	P68/**SCK13_1**/RTO21_1/TIOA14_2	Multicon1
205	P67/**SOT13_1**/RTO22_1/TIOB15_2	Multicon1
206	P66/**SIN13_1**/RTO23_1/TIOA15_2/INT15_2	Multicon1
207	P65/RTO24_1/**INT28_1**	Multicon1 (GINT)
208	P64/CTS4_0/RTO25_1/**INT29_1**	Multicon1 (TINT)
209	**P63**/ADTG_3/RTS4_0/INT30_0/MOEX_0	USB (Host/Device Switch)
210	**P62**/SCK4_0/MWEX_0	USB (Host0 VBUS enable)
211	**P61**/**UHCONX0**/SOT4_0/MALE_0/RTCCO_0/SUBOUT_0	USB
212	**P60**/SIN4_0/**INT31_0**/WKUP3/CEC1_0	USB Direct Flash / DEVICE_VBUS
213	**USBVCC0**	USBVCC0
214	P80/**UDM0**	USB

Notes

- The assembled CAN FD transceiver is specified only up to 2 Mbits/sec whereas the FM4's hardware supports up to 5 Mbits/sec
  - If a specified 5 Mbits/sec transceiver for CAN FD (CAN2) is needed, the 8 pin device TJA1044 can be soldered into the 14 pin footprint of the 2 Mbits/sec TJA1145
  - Small software modification necessary
    - Configure pin P7E as GPIO output
    - Drive pin P7E low
- On a production lot with Spansion branding following errors on the silkplot have been found:
  - JP5 is labeled USB PROG but must be UART PROG
  - The naming labels of RN14 and RN15 near the SD card connector are swapped, there is no electrical problem though
  - Both errors are rectified on all boards with Cypress branding

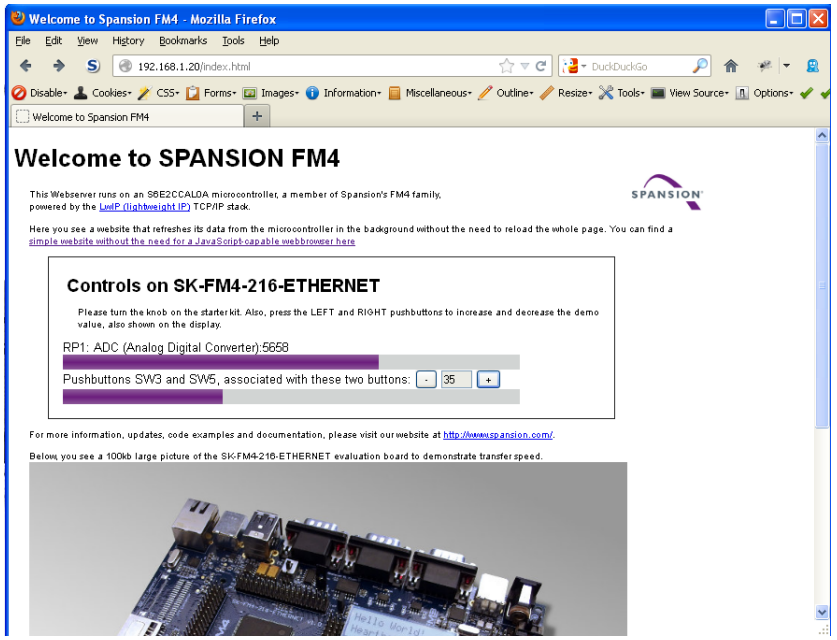
Software

Software Examples

- Software examples for IAR EWARM V6.60 or KEIL µVision5.1:

  See <drive:>\Examples\ or www.spansion.com

  - s6e2cc_template-v14.zip
    - ‚Empty' project as base for user applications
  - s6e2cc_ethernet_driver-v16.zip
    - Spansion low-level Ethernet driver
  - And several more



Note: Please copy the examples to your local drive before compiling!

You can find product information of the commercially supported TCP/IP stack by SEVENSTAX on this CD.

Software Tools

- The following software tools are available
  - USB Virtual-COM port
    - allows UART communciation via the PC‘s USB connection
    - On-board UART-to-USB converter (via X2, CMSIS-DAP)
    - For driver installation <drive:>\drivers\driverinstaller.exe
  - FLASH USB DIRECT Programmer
    - Microcontroller Flash programming (via X12, USB-Device-Port)
    - Install from <drive:>\tools\USBDIRECT
  - Terminal program ‚Serial Port Viewer‘
    - Install from <drive:>\tools\serialportviewer\setup.exe

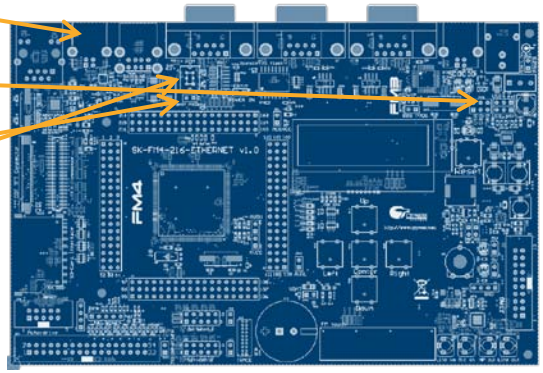
Flash Programming

Flash Programming

- There are several options to program the microcontroller's flash:
  - FLASH USB DIRECT Programmer via X12 (USB device)
    - For installation <drive:>\tools\USBDIRECT\setup.exe
    - USB driver is located in subdirectory of FLASH USB DIRECT Programmer
  - FLASH MCU Programmer via X2 (Serial via DEBUG USB/Serial bridge)
    - For installation <drive:>\tools\PCWFM3-V01L07\setup.exe
    - For driver installation of USB/Virtual-COM port <drive:>\drivers\driverinstaller.exe
  - JTAG Programming via X2 (CMSIS-DAP)
    - Example is given for IAR and KEIL
    - See documentation of your development suite how to setup CMSIS-DAP
  - JTAG Programming via J14 (optional JTAG adapter)
    - The correct JTAG-adapter must be selected in the IDE toolchain

Flash Programming via X12 (USB direct)

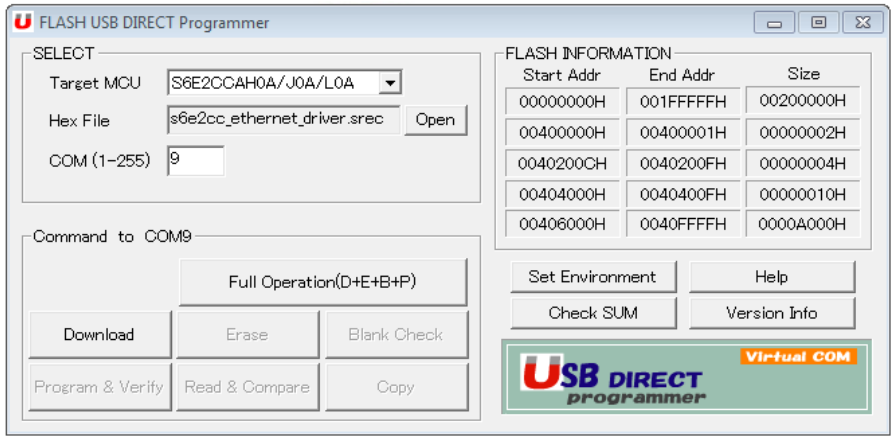
- FLASH USB DIRECT Programming via X12 (USB device)
  - Jumper Setting
    - Select the MCU power supply (JP75, 76, 77)
    - Open JP5 (USB PROG)
    - Set switch S1 to position PGM
  - Connect USB port X12 with the PC
  - If connected for first time Windows OS may ask for a driver
    - See subfolder ‚driver‘ of USBdirect installation path or use <drive:>\drivers\driverinstaller.exe
  - Start the FLASH USB DIRECT Programmer
    - For first installation: <drive:>\Utilities\USBDIRECT\setup.exe
    - Select the COM port
    - Press Reset
    - Start Full Operation
    - Set switch S1 to position RUN
    - Press Reset



Flash Programming via X12 (USB device)

- Select the correct target MCU: S6E2CCAH0A/J0A/L0A
- 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

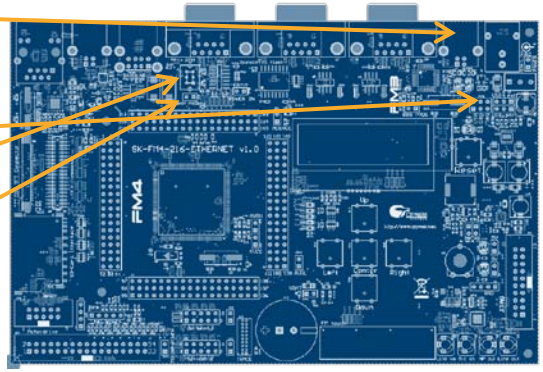
Select MCU: S6E2CCAH0A/J0A/L0A
Select file (*.srec; *.hex)
Select Virtual COM-port



- Use ‚Full Operation‘
  - Download kernel
  - Erase Flash memory / Blank check
  - Program & Verify project to Flash memory
- Set switch S1 to position RUN and press Reset button

Flash Programming via X2 (Serial)

- FLASH MCU Programming via X2 (DEBUG)
  - Jumper Setting
    - Select the MCU power supply (JP75, 76, 77)
    - Close JP5
    - Set switch S1 to position PGM

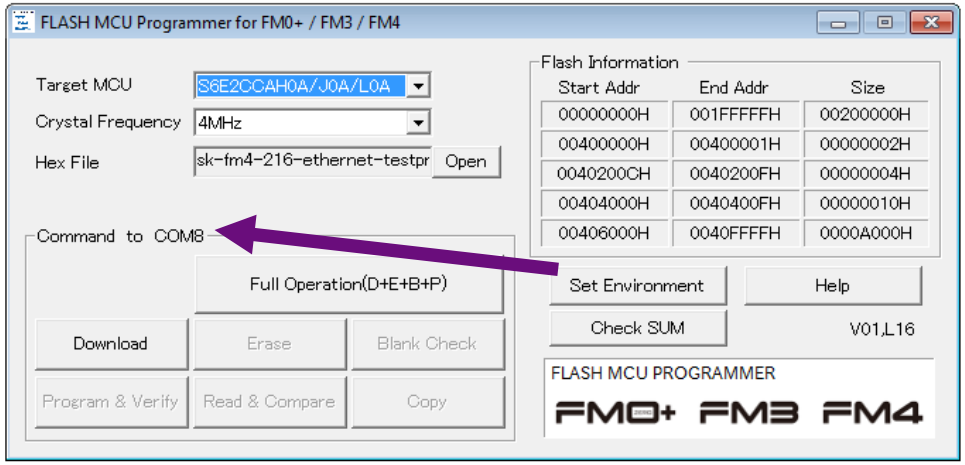


  - Connect the board via USB CMSIS-DAP (X2) to the USB-Port of the PC
    - When connected for first time Windows OS may ask for ‚spansionusbvcomm.inf‘
      - <drive:>\drivers\cmsis-dap
  - Use the FLASH MCU Programmer for FM3/FM4
    - For installation <drive:>\tools\PCWFM3-V01L07\setup.exe

Flash Programming via X2 (Serial)

- Select the correct target MCU: S6E2CCAH0A/J0A/L0A
- 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

Select MCU: S6E2CCAH0A/J0A/L0A
Select 4MHz Crystal Frequency
Select file (*.srec / *.hex)
Select Virtual COM-port
Execute ‚Full Operation‘
incl. stand-alone operations
- **Download Kernel**
- **Erase**
- **Blank Check**
- **Program&Verify**

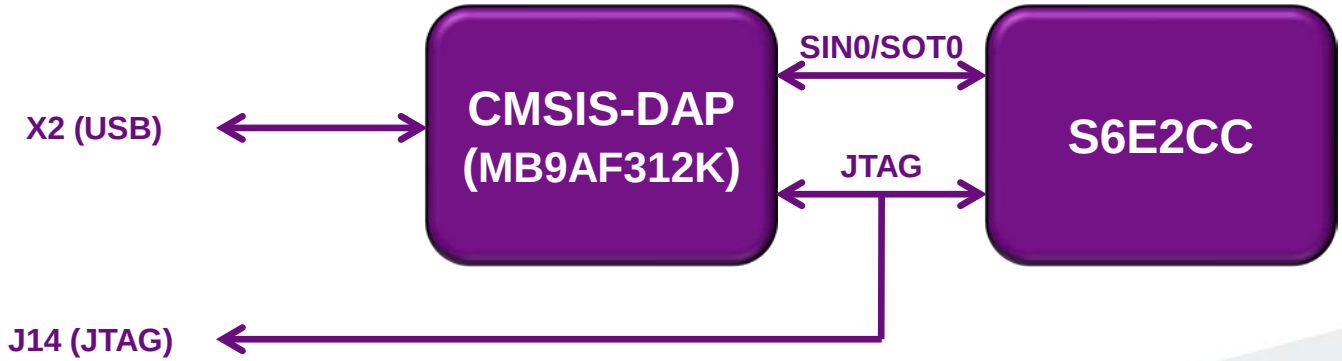


- Set switch S1 to position RUN and press Reset button

JTAG Debugger

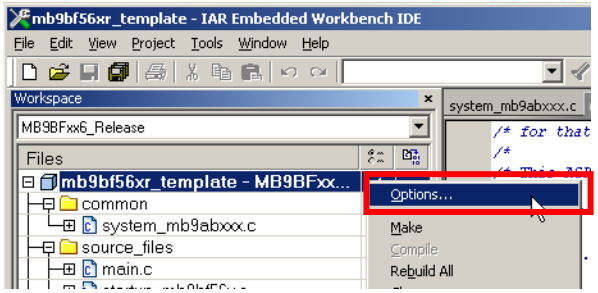
JTAG adapter CMSIS-DAP

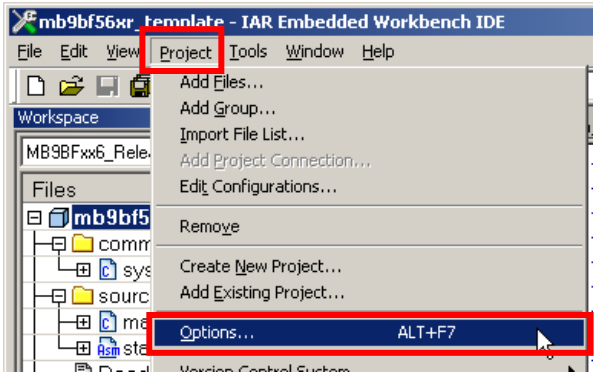
- This starterkit includes an on-board JTAG adapter
  - Compatible to CMSIS-DAP
    http://www.keil.com/support/man/docs/dapdebug/dapdebug_introduction.htm
  - Select debugger CMSIS-DAP in your tool chain
- Any other JTAG-adapter can be connected to J14, too.
  - The correct JTAG-adapter must be selected in the IDE toolchain
    - No jumper setting is required
- Additional virtual COM port is provided by X2 (DEBUG)
    - For driver installation <drive:>\drivers\driverinstaller.exe



Setup in IAR EWARM (1)

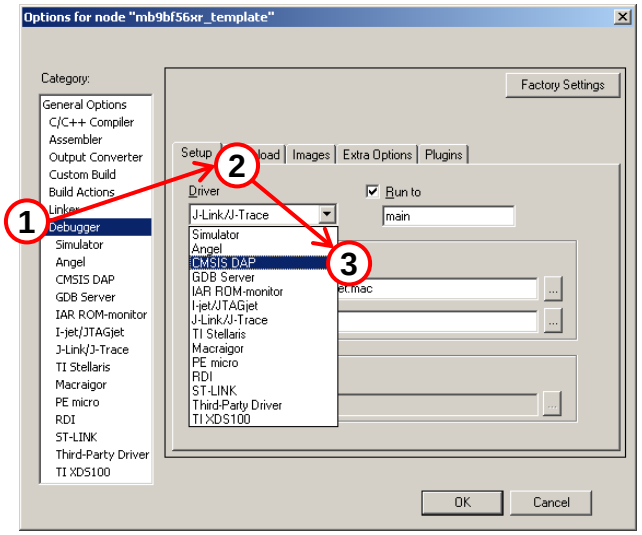
- Navigate to project options:
  - Via Files-List
    - Right-click at the project
    - Select „Options...“
  - Or via menu „Project“
    - Select „Options...“

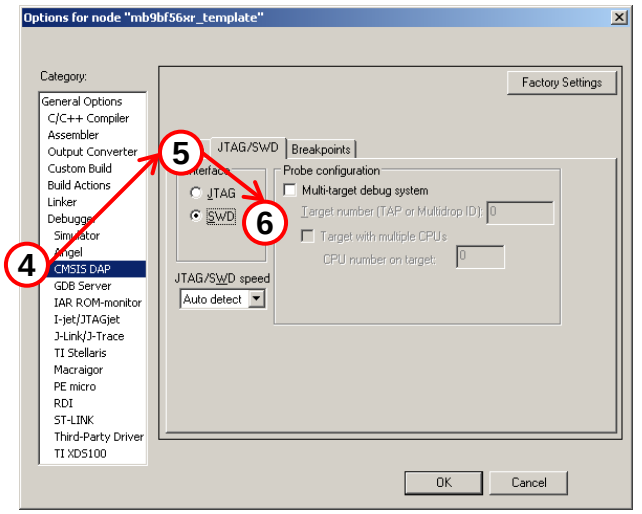




Setup in IAR EWARM (2)

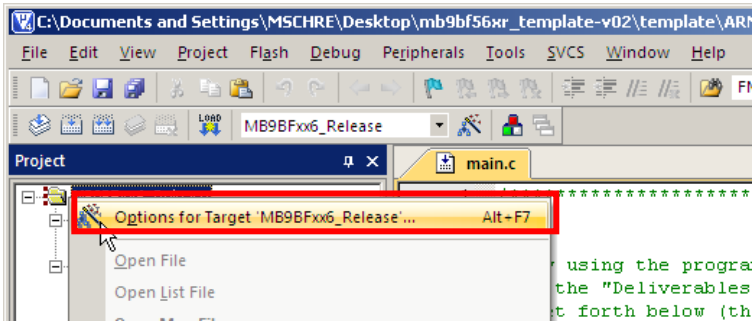
- Setup Project Debbuger Options
  - (1) Navigate to Debugger
  - (2) Select tab „Setup“
  - (3) Select Driver „CMSIS-DAP“
  - (4) Select in „CMSIS-DAP“
  - (5) Select tab „JTAG/SWD“
  - (6) Select SWD

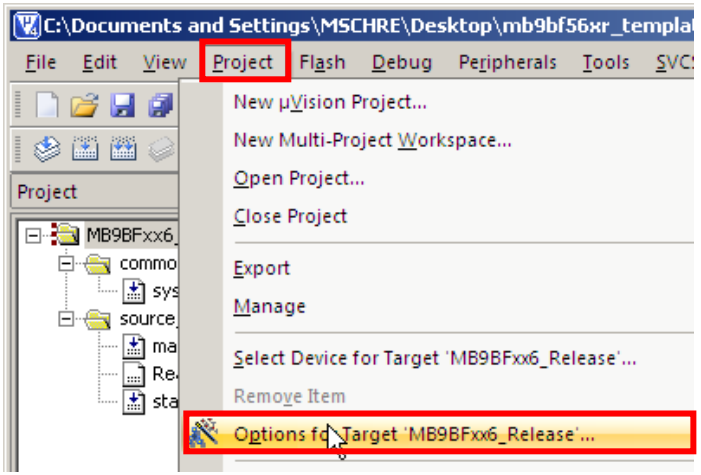




Setup in Keil µVision (1)

- Navigate to project options:
  - Via Project
    - Right-click at the project
    - Select „Options...“
  - Or via menu „Project“
    - Select „Options...“

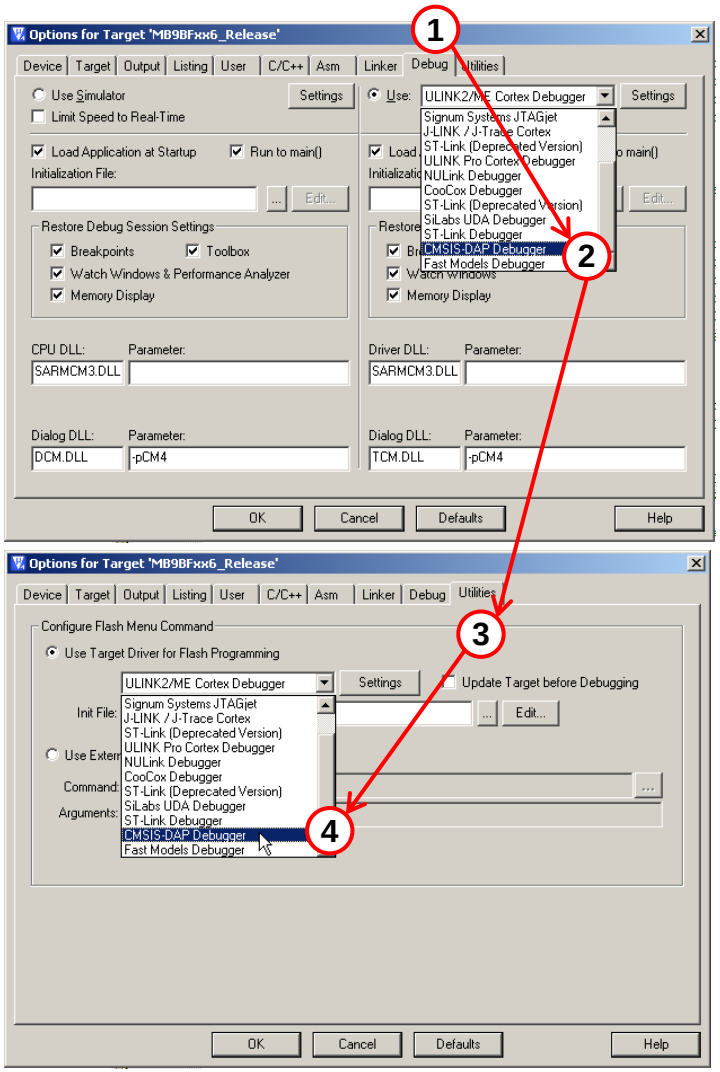




JTAG adapter CMSIS-DAP – within Keil µVision

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“

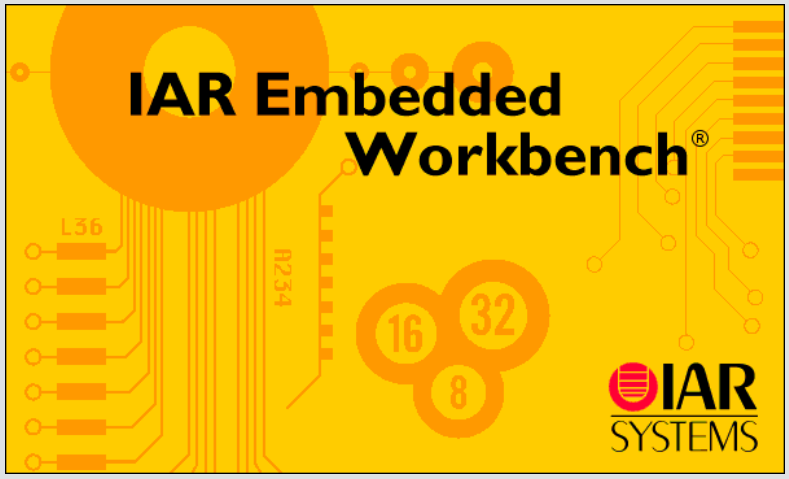


CMSIS-DAP Firmware update

Please see instructions contained in firmware update package!

IAR Embedded Workbench

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

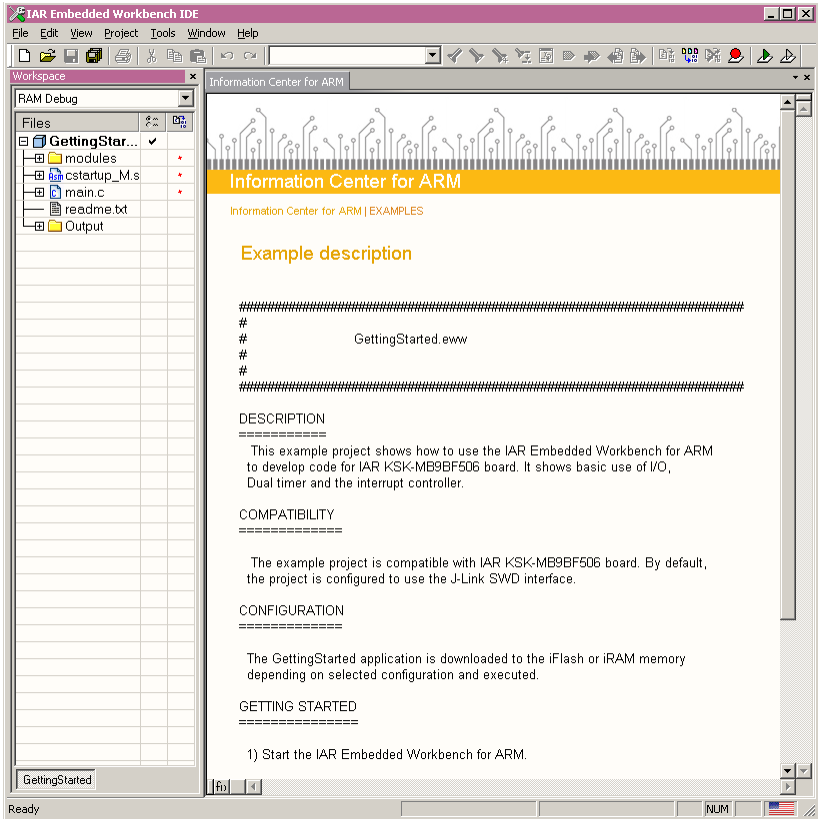


IAR Workbench Getting Started

- 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:>\sw-examples\

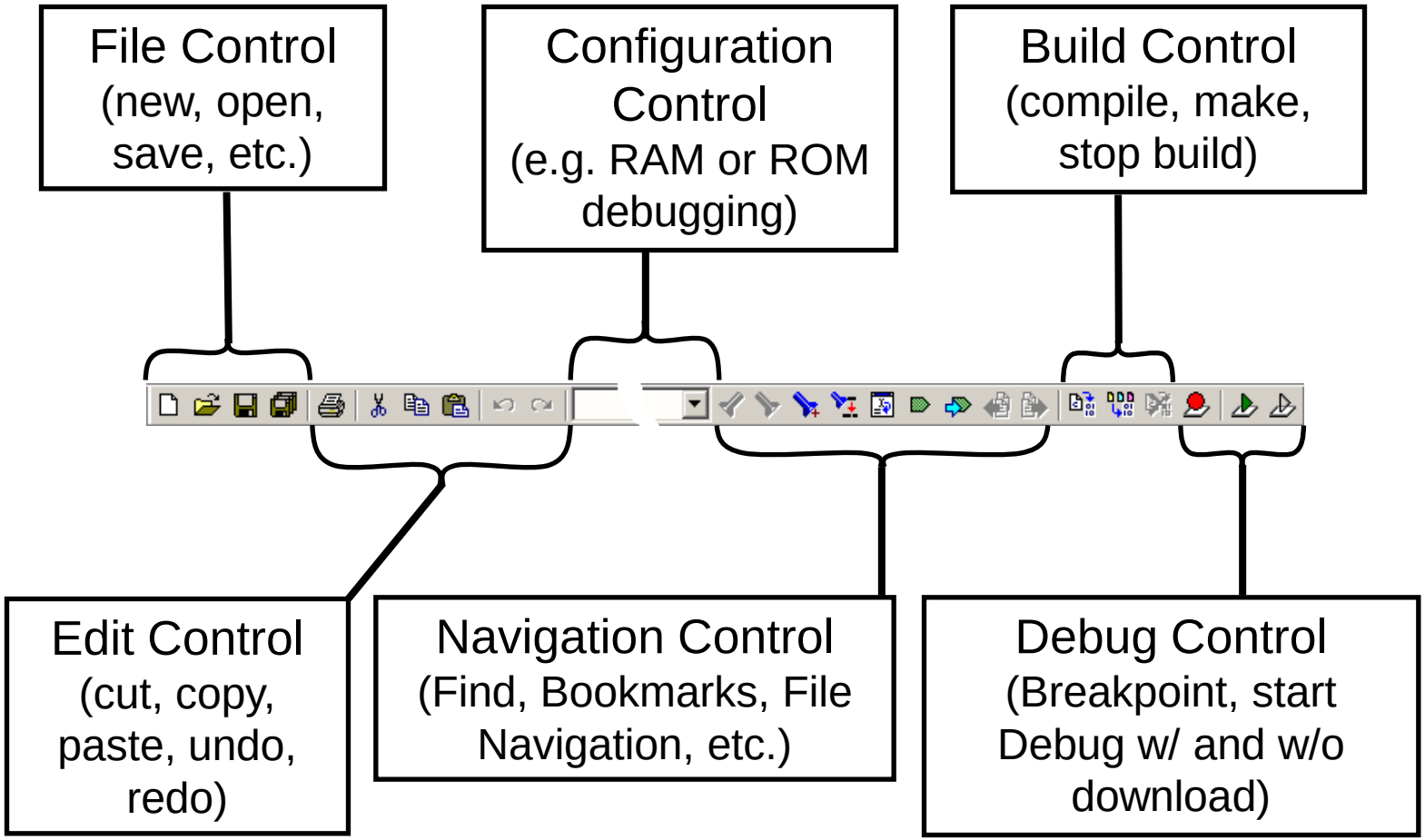
IAR Workbench – Main Window

- 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 ‚mb9bfd1xt_template'



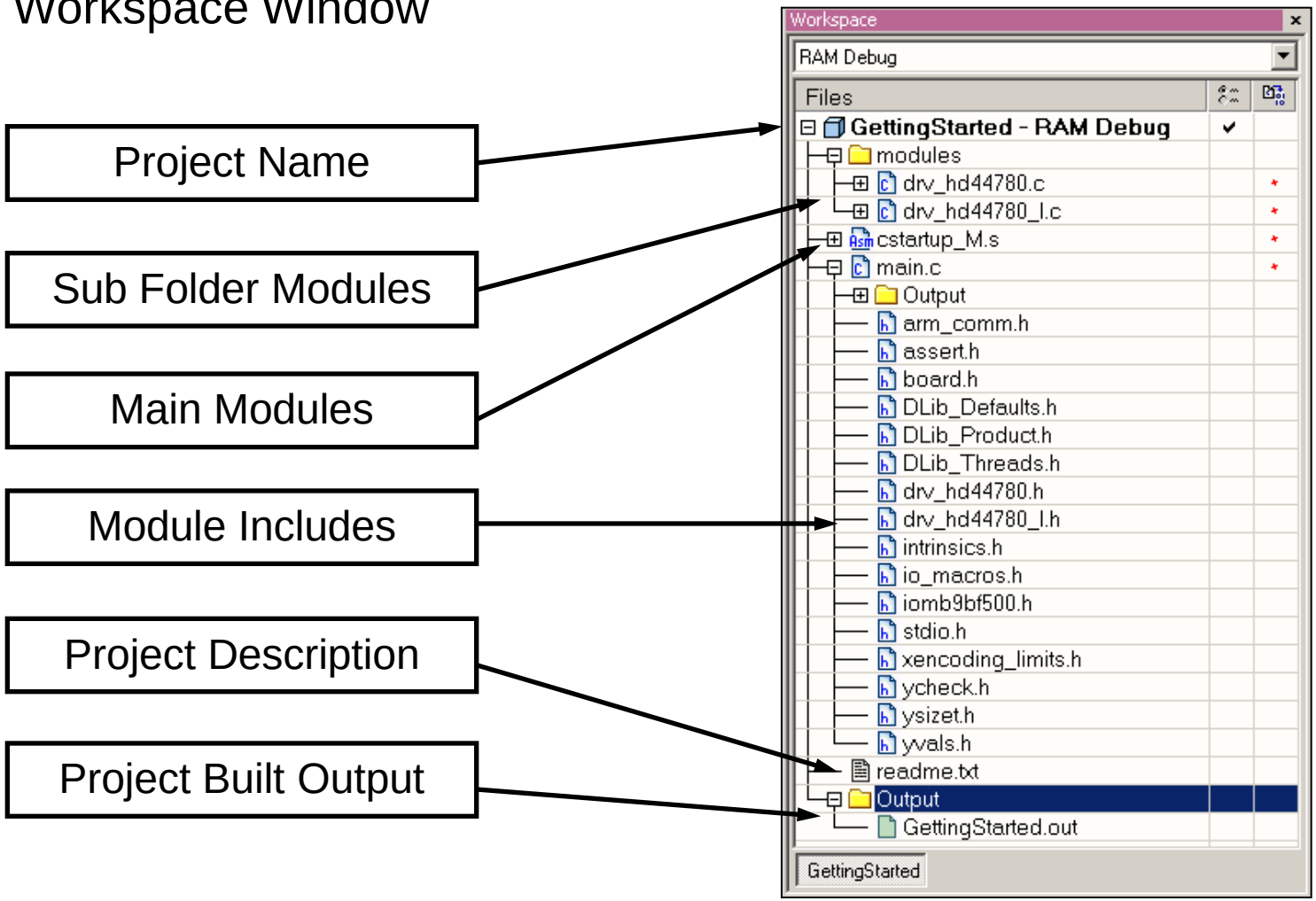
IAR Workbench – Menu Bar

- IAR Menu Bar



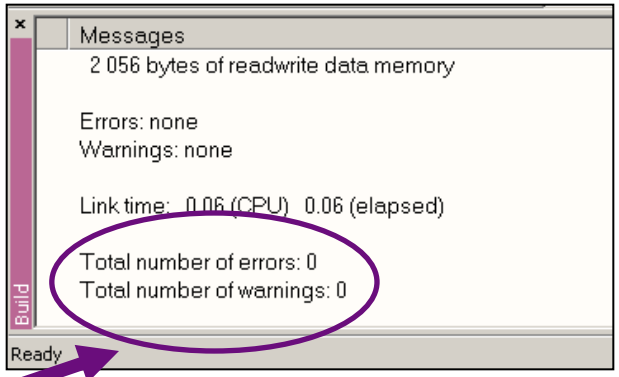
IAR Workbench – Workspace

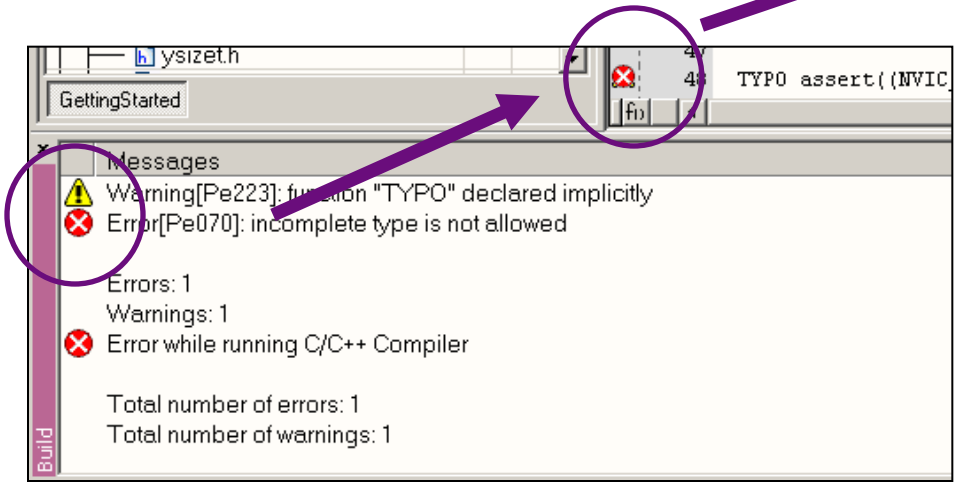
- IAR Workspace Window



IAR Workbench – Making Project

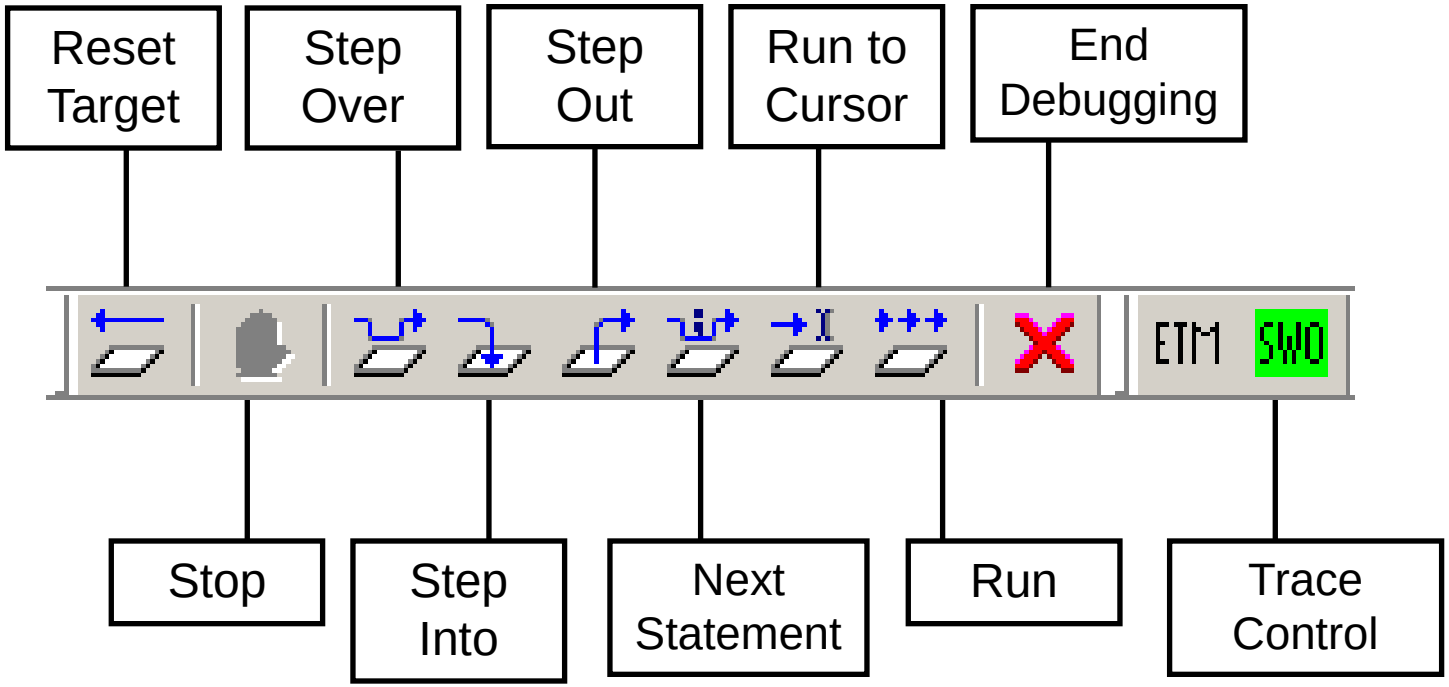
- Making the Project
  - Use Make-Icon ( ), <F7> or Menu: Project→Make
  - Check for no errors in Output window below
  - Build errors are indicated by ⚠ or ⛔ In Output window and Source view





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

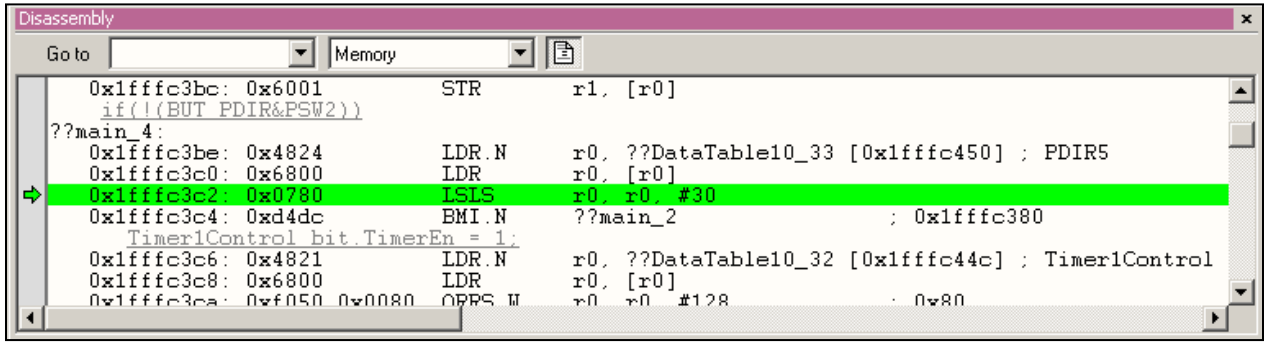


IAR Workbench – Debug (1)

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

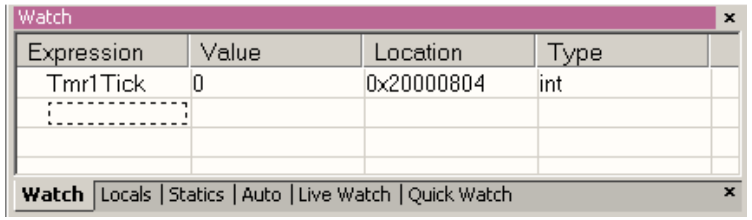
```
165   CSW_TMR_bit.MOWT = 9;
172   PSW_TMR_bit.POWT = 2;
148   Timer1IntClr = 1;
```

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

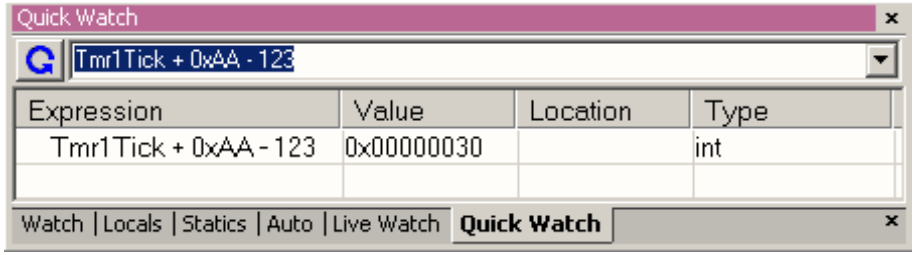


IAR Workbench – Debug (2)

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



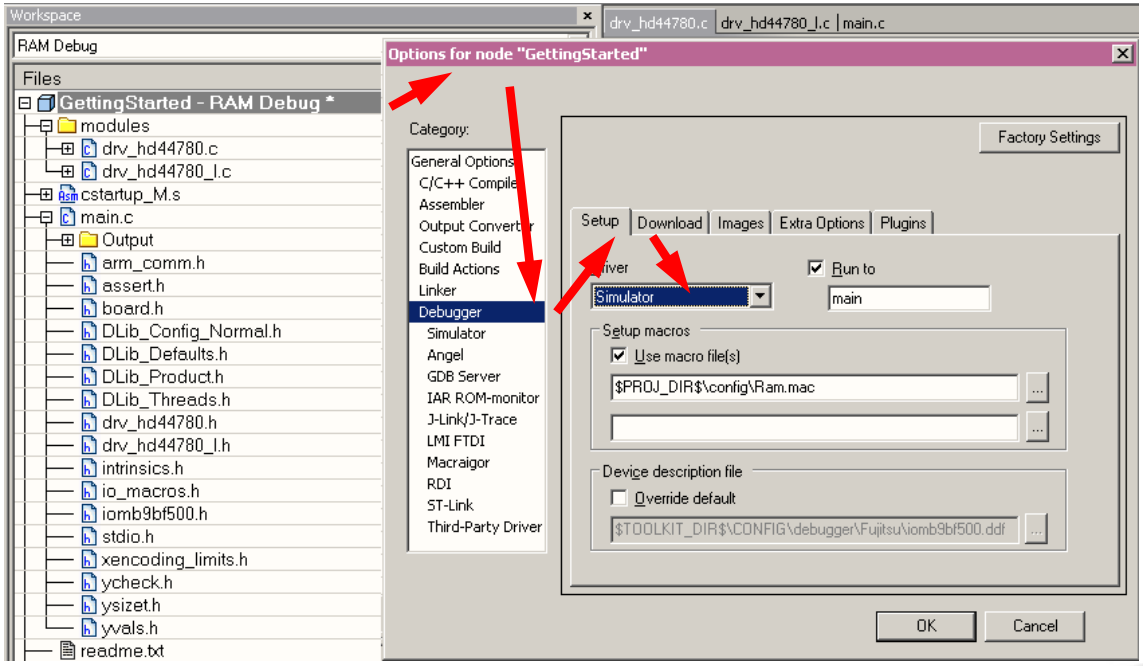
  - Quick Watch
    - The Quick watch allows the user to calculate and recalculate expressions even with variables



    - 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

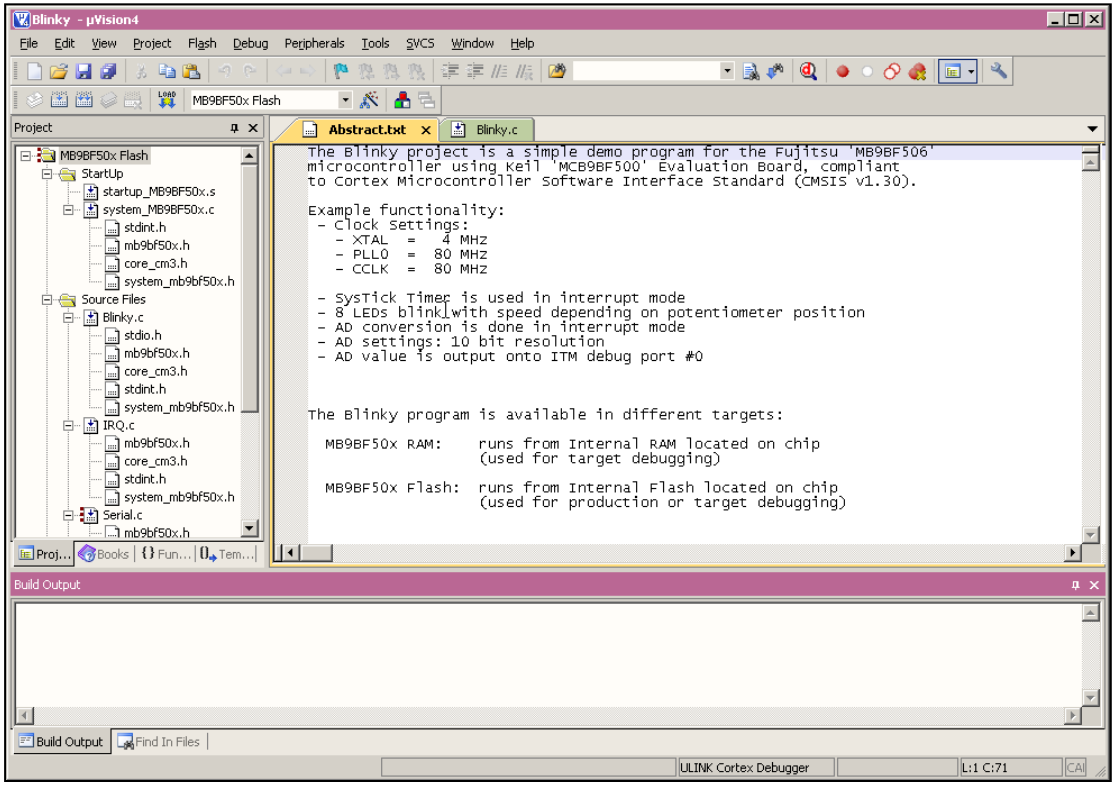
- Installation
- Getting Started
- Open Project
- Build Project
- Debug Project

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

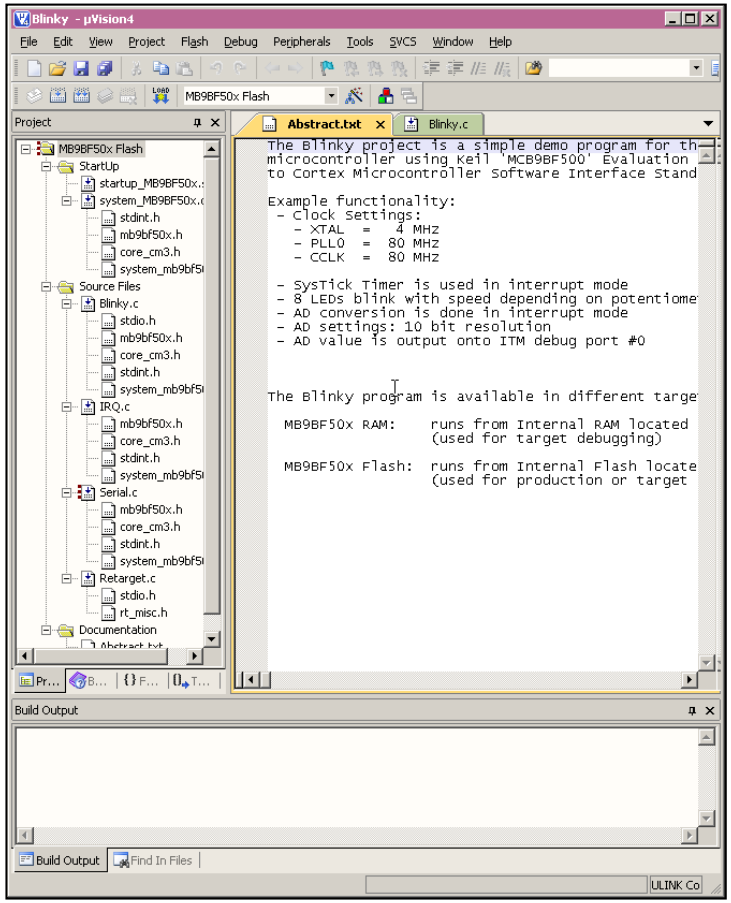
KEIL µVision – Getting Started

- Choose Menu: Project→Open Project...
  - Browse to: <drive:>\sw-examples\mb9bf56xr_gpio-v10\example\ARM\
  - Choose mb9bf56xr_gpio.uvproj



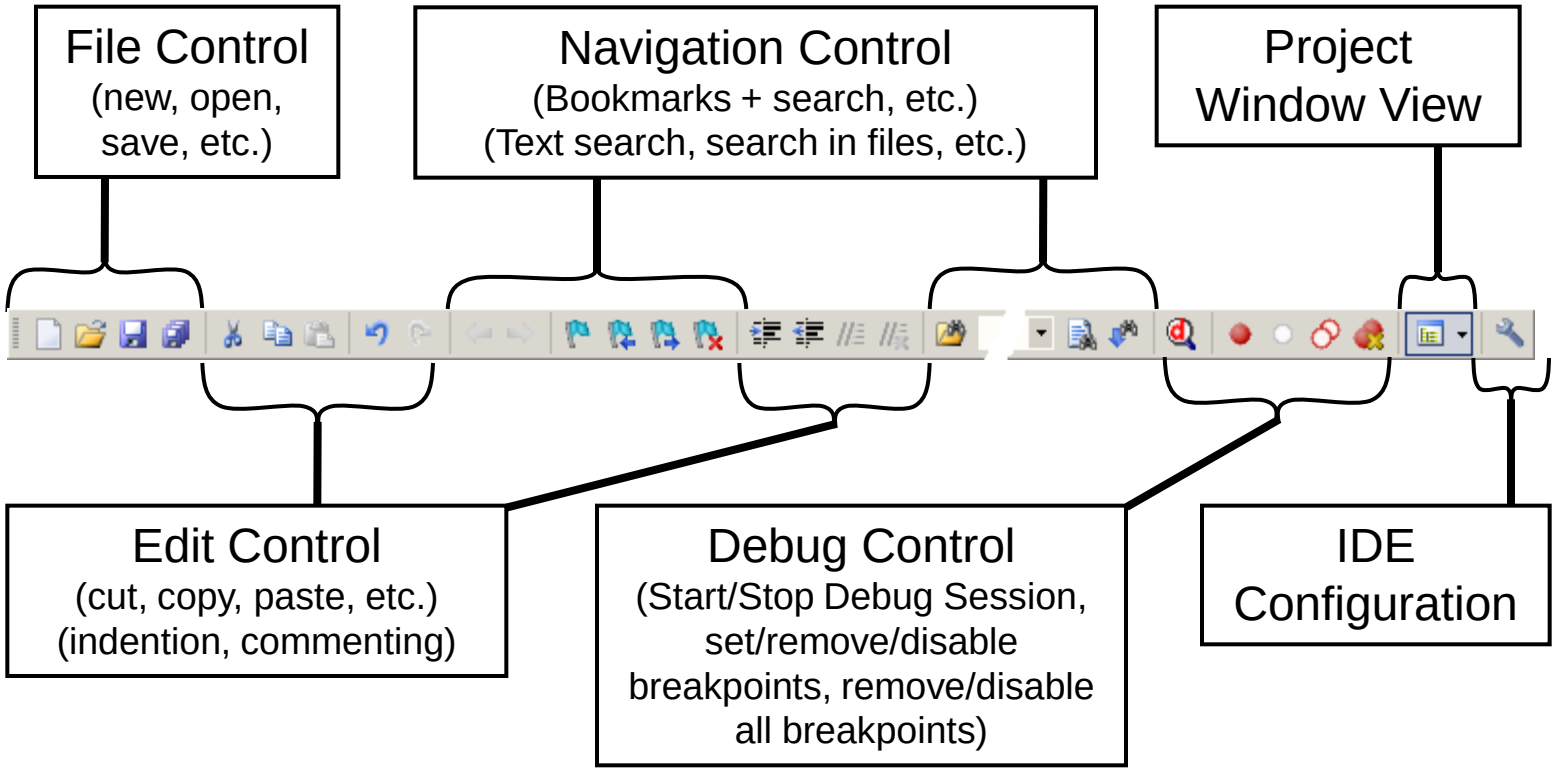
KEIL µVision – Main Window

- 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



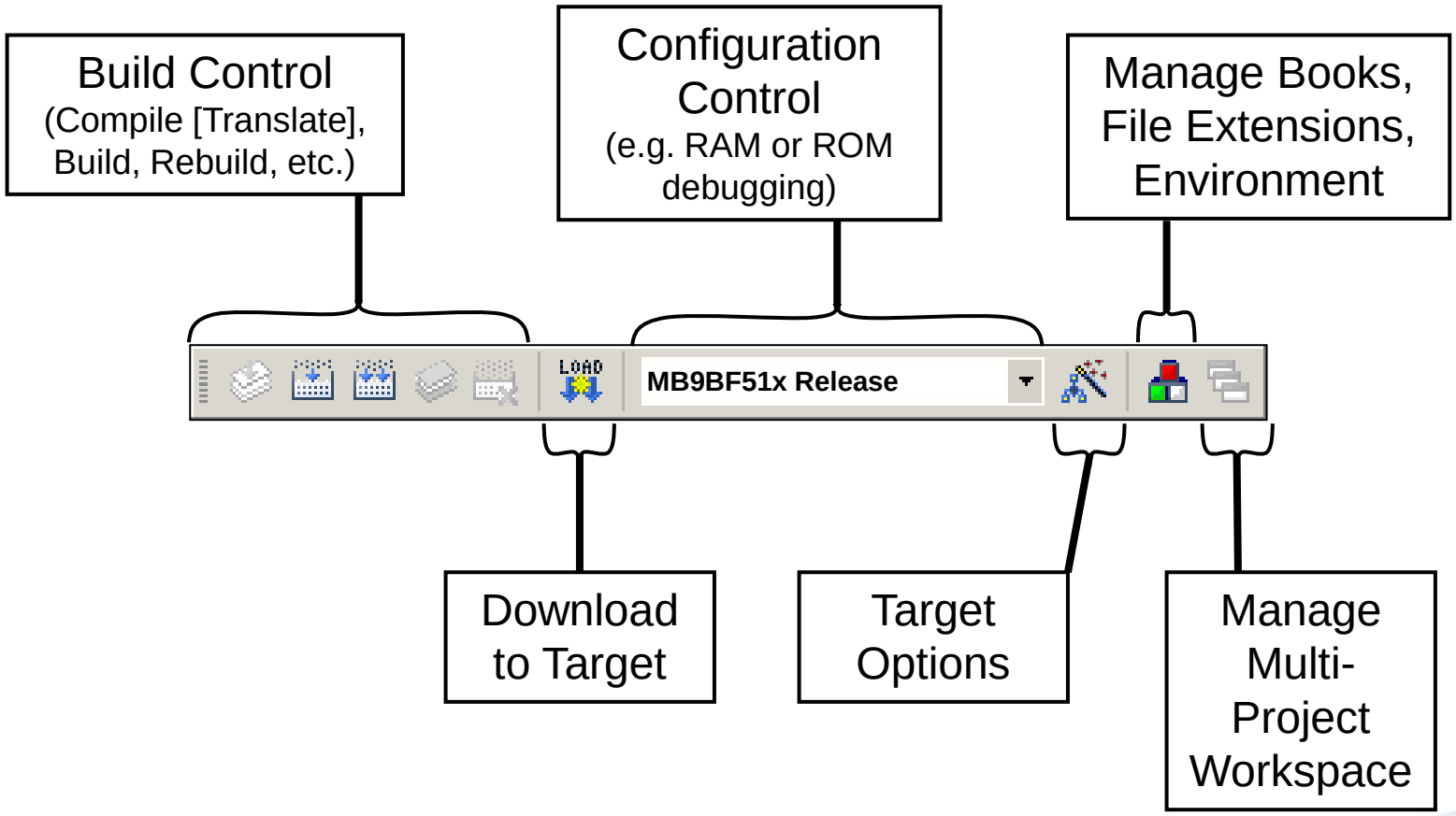
KEIL µVision – Menu Bars (1)

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



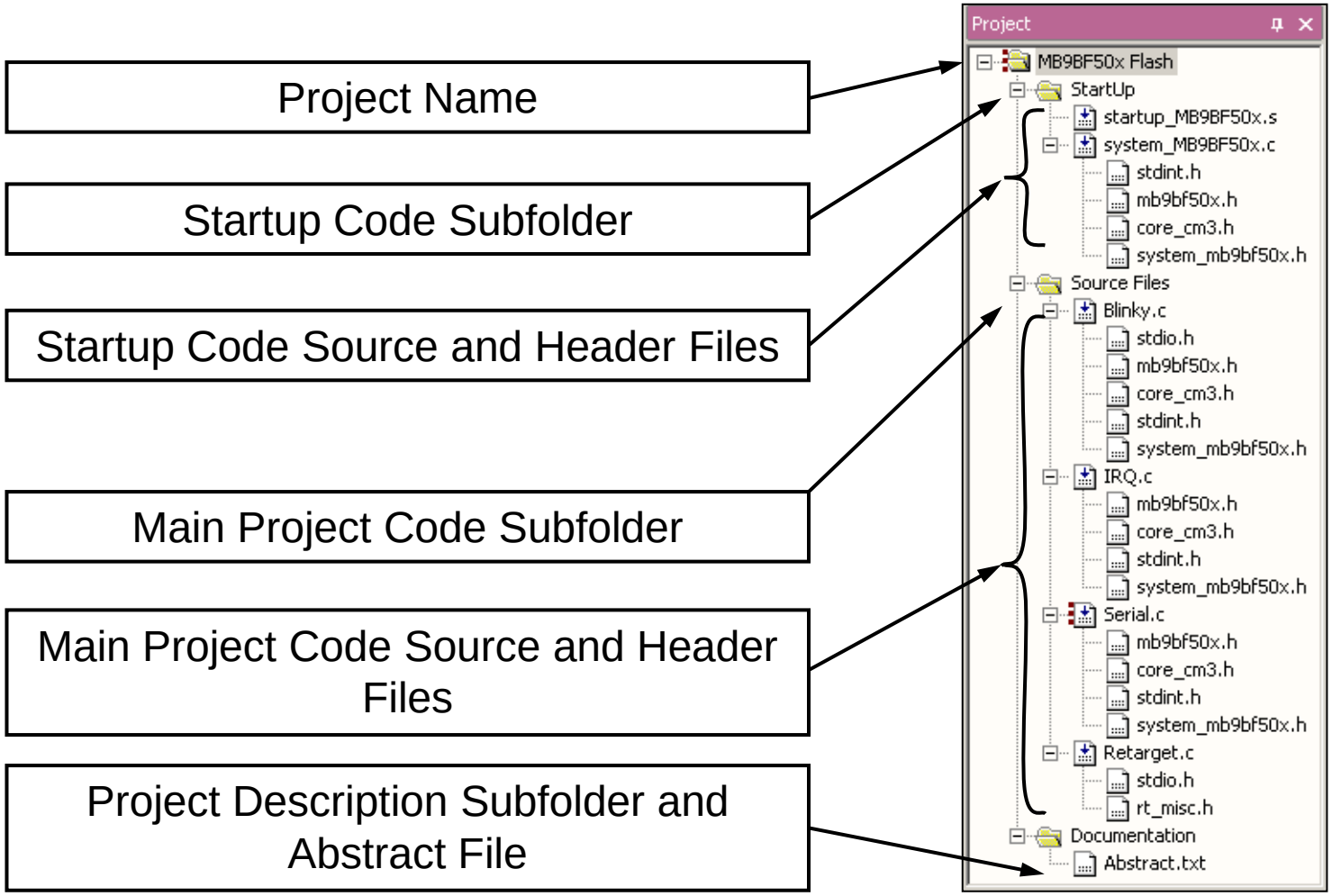
KEIL µVision – Menu Bars (2)

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



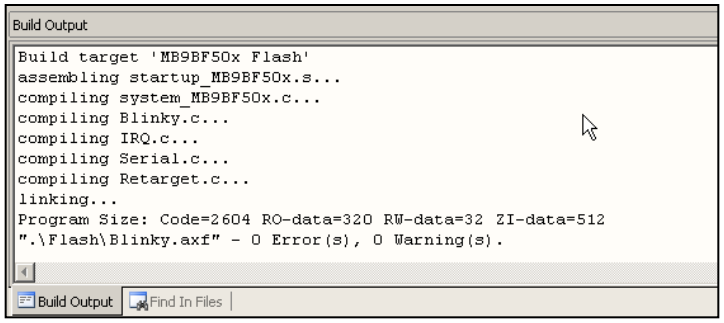
KEIL µVision – Project Window

- µVision Project Window

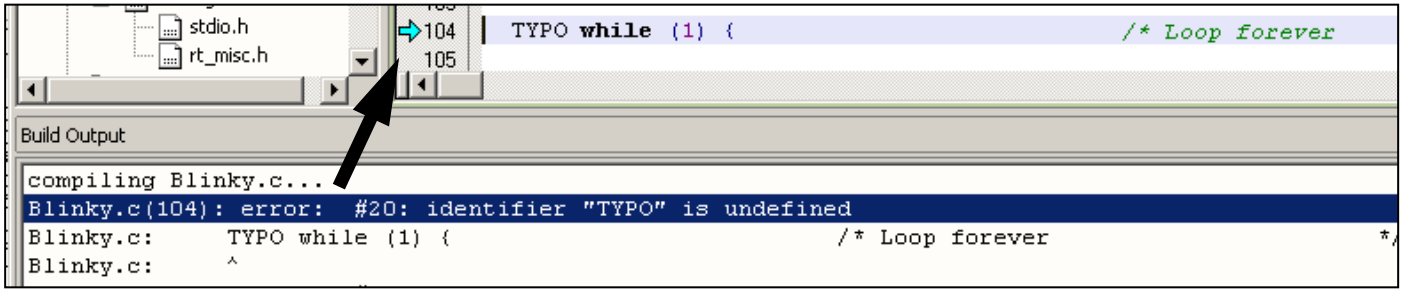


KEIL µVision – Making Project

- 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



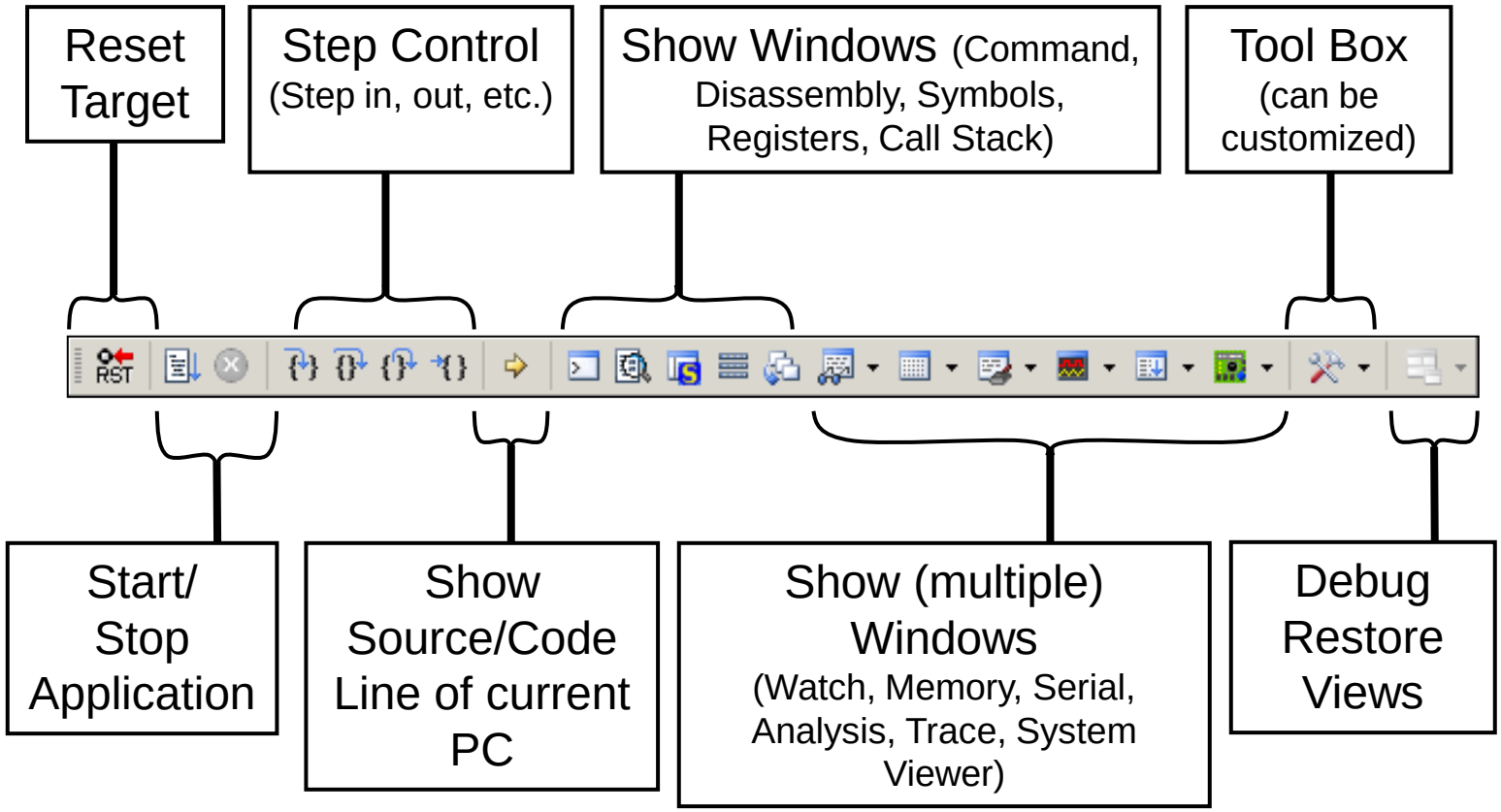
KEIL µVision – Debug (1)

- 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

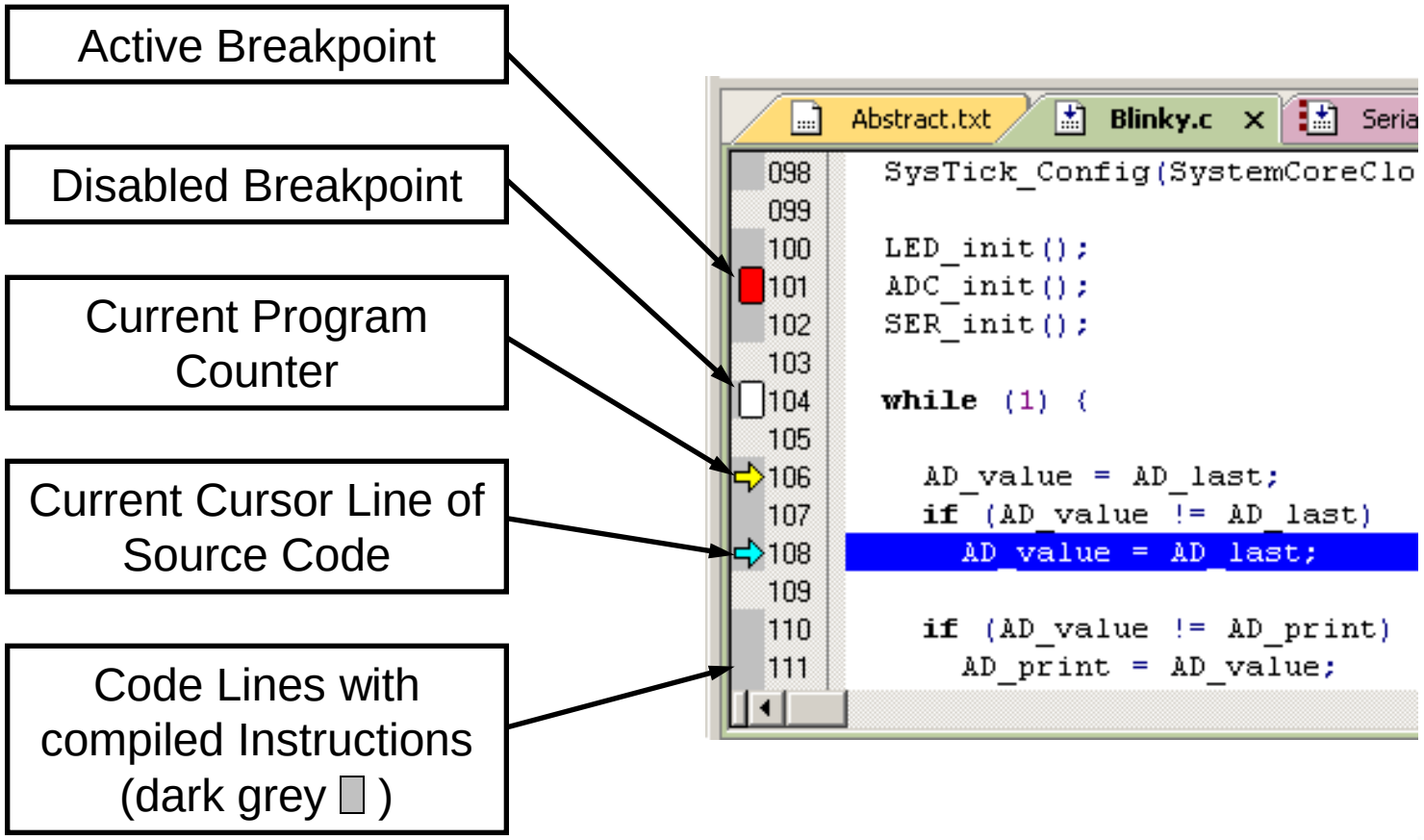
KEIL µVision – Debug (2)

- 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)

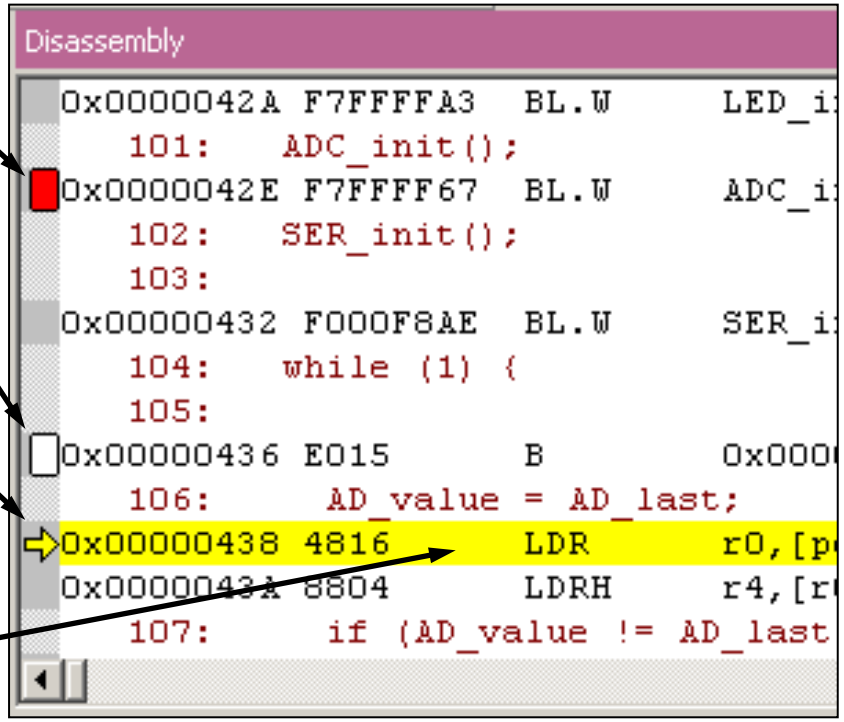
- Disassembly View
  - Mixed mode is selectable and deselectable

Active Breakpoint

Disabled Breakpoint

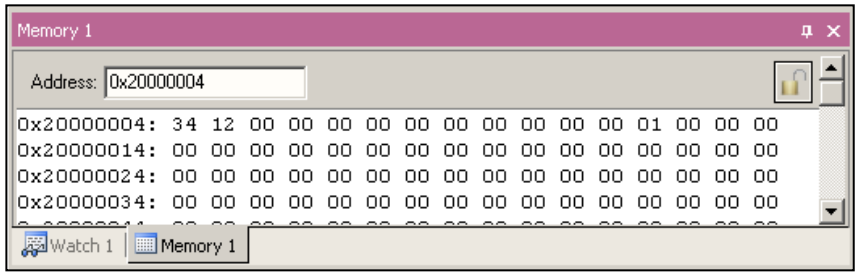
Current Program Counter

Current Cursor Line of Code highlighted in yellow background ( )

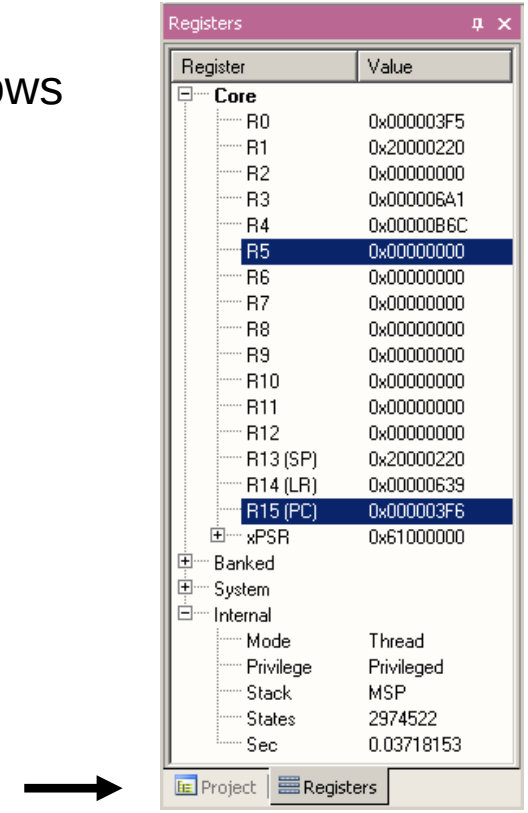


KEIL µVision – Debug (5)

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

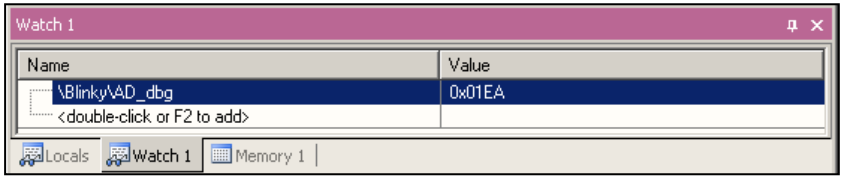


- Register View
  - Register view is a tab of the Project window
  - Changes are highlighted in dark blue text background
  - Register tree knots can be expanded

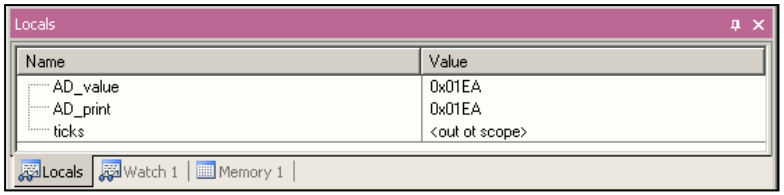


KEIL µVision – Debug (6)

- Variable Windows
  - Watch Windows



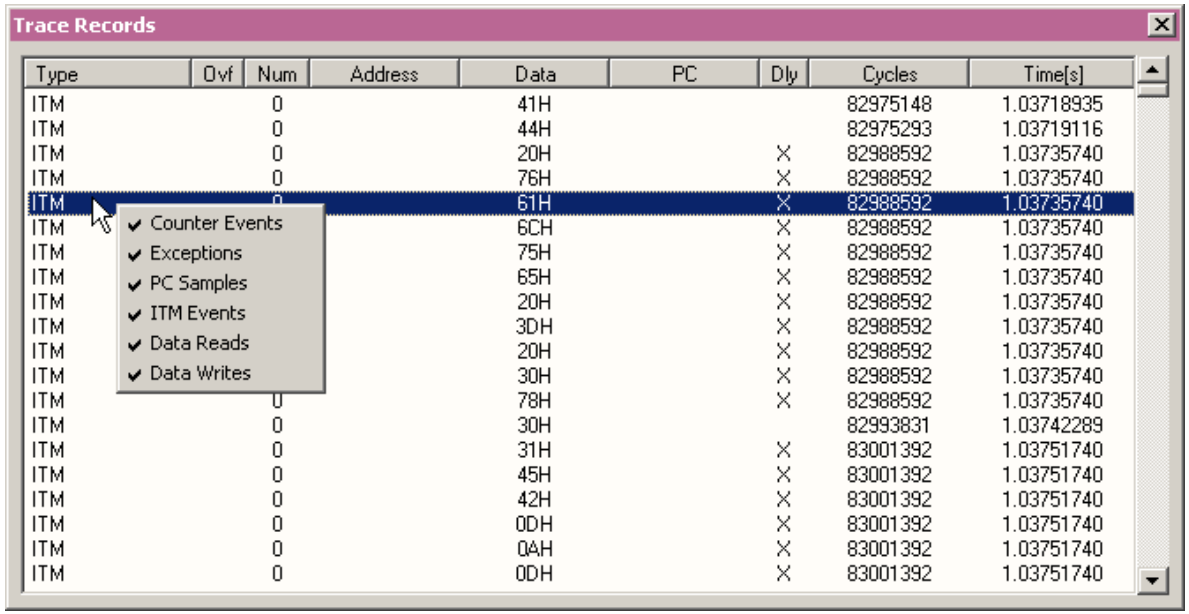
    - Up to 2 Watch windows are sharing their tabs with e.g. Memory and Local views
    - Updated during runtime
    - Any changes are highlighted in dark blue text backround color
    - Displayed values can be changed by user during break
  - Local View



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

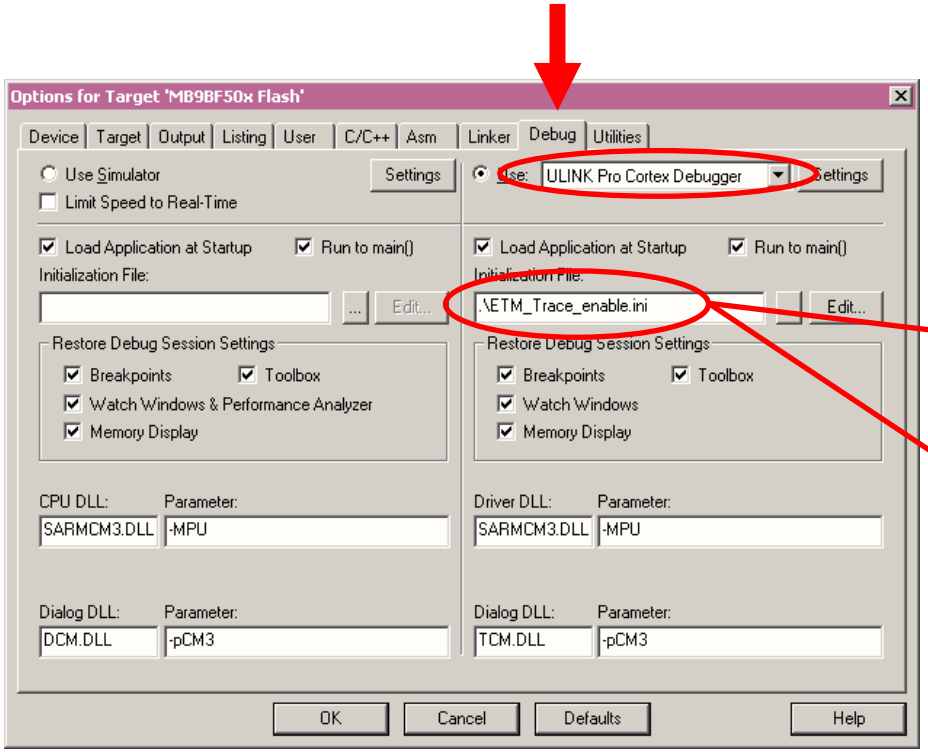
KEIL µVision – Trace (ULINK ME)

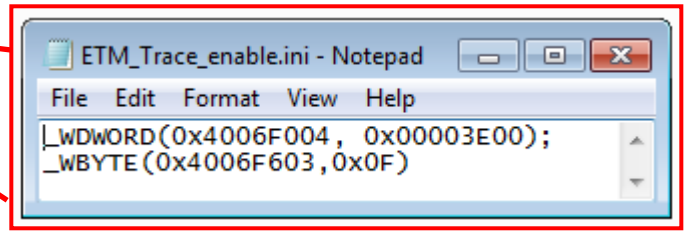
- Trace via ITM
  - Simple Trace views via Instrumentation Trace Macro is supported by µLINK ME
    - Records
    - Exceptions
    - Counters



KEIL µVision – Trace (ULINK Pro) (1)

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



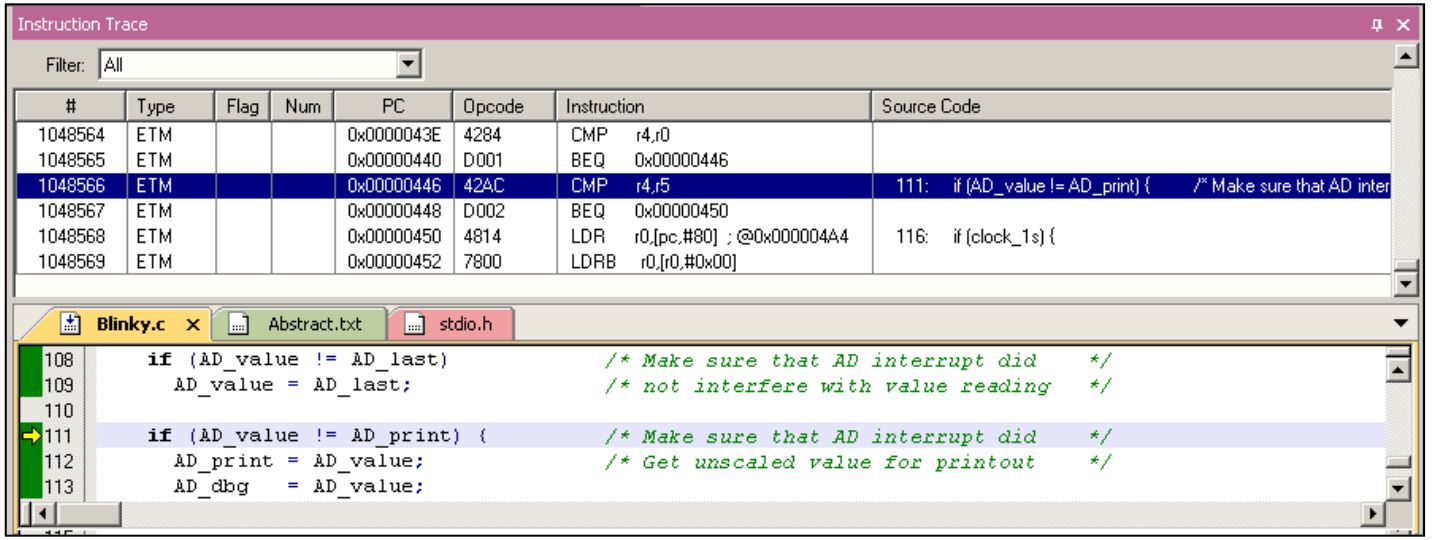


enables ETM pins

This small text file must be created first and sets the PFR and EPFR register bits for the TRACE pins.

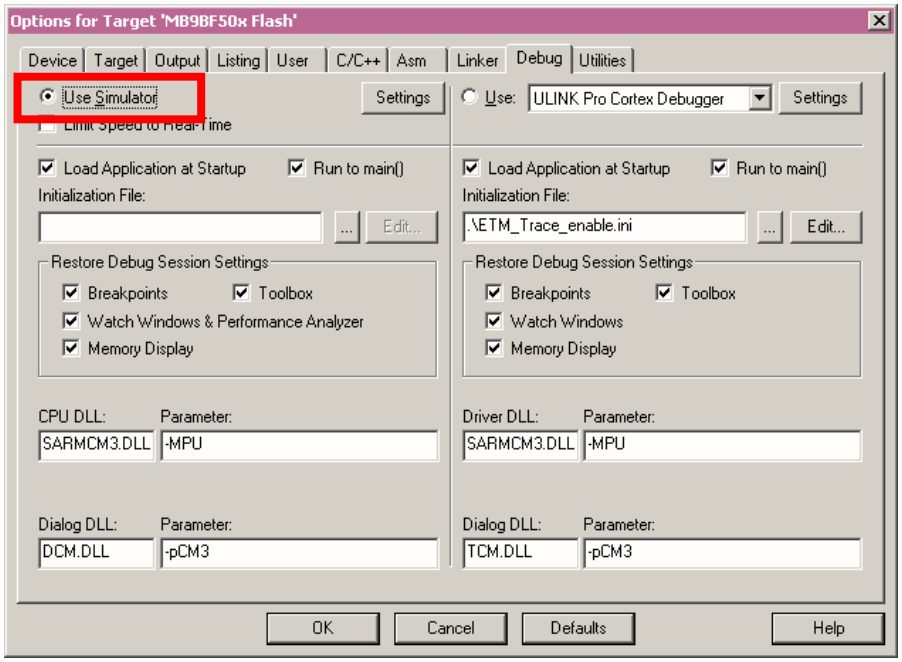
KEIL µVision – Trace (ULINK Pro) (2)

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



KEIL µVision – Simulator

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



Finally

Workshops & Seminars

FM3/FM4 Seminar	Motor Control	USB Workshop	Ethernet Workshop
Please register here: http://news.spansion.com/seminars			
• Overview FM3/FM4 family • Memory • Peripheral resources • Packages • Processor architecture • Bus structure • Flash memory • Flash programming • Peripheral resources • Clock distribution • Timer • Interfaces • FM3 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-up 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-up 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 •Ethernet based industrial automation networks (Fieldbus)

Spansion Support

- Please check the following website, for any available updates

  www.spansion.com

- 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