Getting Started Guide

IAR KickStart Kit™ for Fujitsu MB9BF516R

L36

This guide briefly describes how to get started using IAR Embedded Workbench® for ARM with IAR J-Link OB (on-board) debug interface to run an example application on the MB9BF516R-SK target system.

For more detailed information, see the *IAR Embedded Workbench IDE User Guide* and the *C-SPY Debugging Guide*, which are available from the Help menu in the IAR Embedded Workbench IDE and IAR Information Center.



Install IAR Embedded Workbench for ARM



The installation DVD contains all the software and documentation you need to start building and running embedded applications on the MB9BF516R-SK evaluation board. We recommend that you follow the installation instructions on the DVD and use the default directories for installation.

- 1 Insert the installation DVD. The installation program will start automatically.
- 2 First choose which board you are working with, and then move on to the CHOOSE SOFTWARE page.
- **3** Select the IAR Embedded Workbench for ARM installation of your choice. We recommend the Kickstart edition which has no time limit.



Figure 1 - Choose software

4 You will be directed to an online Product Registration page to get your license number and key, which will be delivered to you via e-mail within a few minutes. After this you will be able to install the software. Note that it may take several minutes for the installation files to unpack.

Install the J-Link USB driver

Before you can use the J-Link OB over the USB port, the J-Link USB driver must be installed.

- 1 Connect your computer and the J-Link-OB(USB3) using the USB cable. The Power LED on the evaluation board should be lit.
- 2 If this is the first time that you are using the J-Link, Windows will start the Install wizard. Choose Install from a specific location. If the installation wizard does not start automatically, see note below.
- 3 When asked to locate the USB drivers, click the browse button and navigate to the \IAR Systems\Embedded Workbench 6.x Kickstart\arm\drivers\JLink\x86 or x64 directory, depending on your computer system.
- 4 Click Finish. The J-Link USB driver is now installed. Note: If the installation wizard does not start automatically, or you get a message that the driver has not been installed properly, please navigate to \arm\drivers\Jlink\ and start the InstDrivers application. This will install the J-Link USB driver and the LED should stay lit steadily.



Set up the evaluation board

After you have installed the software and the J-Link USB drivers, you need set the jumpers, see Table-2. The MB9BF516R-SK evaluation board can be powered from four different sources. You can select the power source by JP1.

- Power jack. Use an external power supply to feed 5V power $\stackrel{\perp}{\longrightarrow}$ to the evaluation board.
- JTAG connector. Some debug probes, like IAR J-Link, supply 5V through pin 19.
- USB connector for on-board debugger (J-Link OB).

Run example projects

To take full advantage of the examples, you must have some working knowledge of IAR Embedded Workbench IDE. For a quick introduction, see the **GETTING STARTED** and the **TUTORIALS** in the **IAR Information Center for ARM**, see Figure-2.

- 1 From the Start menu, start IAR Embedded Workbench IDE by choosing All Programs>IAR Systems>IAR Embedded Workbench for ARM 6.x Kickstart>IAR Embedded Workbench. You will get straight into the IAR Information Center for ARM.
- 2 Click EXAMPLE PROJECTS.

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	IAR Information Center for ARM Here you will find all the information you need to get started tutonails, example projects, user and reference guides, support information, and release notes.
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- 3 Select Fujitsu>MB9BF51X> IAR MB9BF516R-SK evaluation board.
- 4 Open an example project; for example, Blinking LED (click the ¹¹ icon).
- **5** Choose a destination folder to save a copy of this project for testing, so that the original project will not be updated for any changes you made during testing.
- 6 Follow the instructions in the Example description to configure the board, and choose your build configuration, for example **RAM Debug**.





Figure 3 - Example description and Build configuration

- 7 Choose **Project>Make** or click the button on the toolbar. The project should compile with no errors or warnings.
- 8 To download your program, choose **Project>Download and Debug** or click the *button*.
- **9** The file main.c is now open in the editor window. Choose **Debug>Go** or click the *button* to start the application.
- **10** To stop C-SPY, choose **Debug>Break** or click the **b**utton.
- **11** To exit C-SPY, choose **Debug>Stop Debugging** or click the **button**.
- 12 Now you can try other example projects included, just click Help>Information Center to bring up the IAR Information Center again.

MB9BF516R-SK evaluation board overview





Connector description

Connector	РСВ	Description	
JTAG	JTAG	JTAG connector	
TRACE	TRACE	TRACE connector	
USB1	USB Device	USB Device connector	
USB2	USB HOST	USB HOST connector	
USB3	USB	USB connector for on-board debugger	
J1	J1	Pin header (MCU external pin)	
J2	J2	Pin header (MCU external pin)	
J3	J3	Power Supply 5V DC	

Table 1 - Connector description

Switches description

Switches	Description
	1: MD0 of MB9BF516R SW-ON: L, SW-OFF: H
DSW1	2: MD1 of MB9BF516R SW-ON: L, SW-OFF: H
DSWI	3: P21 of MB9BF516R SW-ON: L, SW-OFF: H
	4: P22 of MB9BF516R SW-ON: L, SW-OFF: H
USB Select	Host / Device
RESET(SW1)	Reset button
USER(SW2)	User button

Table 2 - Switches description



Jumper descriptions



Jumper description

Jumper	PCB	Description
	OB	USB 5V power supply
JP1	JTAG	JTAG 5V power supply (pin 19)
	JACK	Power jack 5V power supply
		MCUVCC 3.3V/5V
JP2		1-2: +3.3V
		2-3: +5V
ID2		Enabel Power supply for MCU
JP3		ON (close) / OFF (open)
ID4	GPIO	1-2: use P81/UDP0 and P80/UDM0 pin as GPIO (P81, P80)
JF4	USB •	2-3: use P81/UDP0 and P80/UDM0 pin as USB (UDP0, UDM0)
105	ITAC SEI	Select ICE (debugger)
JF 5	JIAU SEL	External JTAG ICE (close) / On-board debugger (open)
JP7		Connect P21 of MB9BF516R to DIP-SW (DSW1-3).
JP8		Connect P22 of MB9BF516R to DIP-SW (DSW1-4).

Table 3 - Jumper description



External connectors description

JTAG

The JTAG connector allows the software debugger to communicate via a JTAG (Joint Test Action Group) port directly with the core. Instructions can be inserted and executed by the core thus allowing MB9BF516R memory to be programmed with code and executed step by step by the host software. For more details, refer to the IEEE Standard 1149.1 - 1990 Standard Test Access Port and Boundary Scan Architecture and



Pin #	Signal name	Signal type	Description
1	VTreF		Target reference voltage – Connected to +3.3V/+5V.
2	VCC		Power supply – Computex ICE provide power through this pin
3	nTRST	Input	JTAG reset – The TRST pin can be used to reset the test logic within the Embedded ICE logic
4	NC		
5	TDI	Input	Test Data In – This is the serial data input for the shift register.
6	NC		
7	TMS	Input	Test Mode Select – The TMS pin selects the next state in the TAP state machine.
8	NC		
9	ТСК	Input	Test Clock – This allows shifting of the data input, on the TMS and TDI pins. It is a positive edge triggered clock with the TMS and TCK signals that define the internal state of the device.
10	GND		
11	RTCK		Return test clock signal – Some targets must synchronize the JTAG inputs to internal clocks. To assist in meeting this requirement, you can use a returned, and retimed, TCK to dynamically control the TCK rate. J-Link supports adaptive clocking, which waits for TCK changes to be echoed correctly before making further changes. Connect to RTCK if available, otherwise to GND
12	GND		
13	TDO	Output	Test Data Output – This is the serial data output from the shift register. Data is shifted out of the device on the negative edge of the TCK signal
14	GND		
15	nRST		Target CPU reset signal. Typically connected to the RESET pin of the target CPU, which is typically called nRST, nRESET or RESET.
16	GND		
17	NC		
18	GND		
19	VCC		Power supply - J-Link or some other ICE provide power through this pin.
20	GND		

MB9BF516R datasheets and its user manual.

Table 4 - JTAG signals and descriptions



Trace connector

Pin #	Signal name	Signal type	Description
1	VTreF	Output	Target reference voltage - Connected to $+3.3V/+5V$.
2	SWDIO/TMS	I/O / Input	Serial wire date input / output / JTAG mode set - Connected to SWDIO/TMS of MB9BF516R.
4	SWCLK/TCK	Input	Serial wire clock / JTAG clock - Connected to SWCLK/TCK of MB9BF516R.
6	SWO/TDO	Output	Serial Wire Output trace port / Test data out - Connected to SWO/TDO of MB9BF516R
8	TDI	Input	JTAG data input - Connected to TDI of MB9BF516R.
10	nRESET	Input	JTAG reset - Connected to RESET of MB9BF516R.
12	TRACECLK	Output	Trace clock - Connected to TRACECLK of MB9BF516R
14	TRACEDATA[0]	Output	Trace data pin 0 - Connected to TRACE0 of MB9BF516R
16	TRACEDATA[1]	Output	Trace data pin 1 - Connected to TRACE0 of MB9BF516R
18	TRACEDATA[2]	Output	Trace data pin 2 - Connected to TRACE0 of MB9BF516R
20	TRACEDATA[3]	Output	Trace data pin 3 - Connected to TRACE0 of MB9BF516R
7,11,13,	NC		
3,5,9,15,1 7,19	GND		

Table 5 - Trace signals and descriptions

USB Connector (USB1:USB-Device)

Pin #	Signal name	Signal type	Deccription
1	VBUS	Input	Connected to P60-pin of MB9BF516R
2	USB1_N	Input/Output	USB Data-
3	USB1_P	Input/Output	USB Data+
4	NC		
5	GND		GND
6	SHIELD		

Table 6 - USB signals

USB Connector (USB2: USB-HOST)

Pin #	Singnal name	Signal type	Description
1	VBUS	Output	USB +5V
2	USB2_N	Input/Output	USB Data-
3	USB2_P	Input/Output	USB Data+
4	GND		GND
5	SHLD1		
6	SHLD2		

Table 7 - USB signals



Pin #	Signal name	Signal type	Deccription	
1	VBUS	Input	+5V Input	
2	USB3_N	Input/Output	USB Data-	
3	USB3_P	Input/Output	USB Data+	
4	NC			
5	GND		GND	
6	SHIELD			

USB Connector for On-board Debugger (USB3)

Table 8 - USB signals for On-board debugger

MCU External pin 1 (J1: Pin header)

Pin #	Signal name	Pin #	Signal name
1	MCUVCC	31	MCUVCC
2	P50	32	P40
3	P51	33	P41
4	nUFLG	34	P42
5	P53	35	P43
6	P54	36	P44
7	P55	37	P45
8	P56	38	NC
9	P57	39	NC
10	P58	40	NC
11	P59	41	NC
12	P5A	42	NC
13	P5B	43	nRES
14	P30	44	P48
15	P31	45	P49
16	P32	46	P4A
17	P33	47	P4B
18	P34	48	P4C
19	P35	49	P4D
20	P36	50	P4E
21	P37	51	P70
22	P38	52	P71
23	P39	53	P72
24	P3A	54	P73
25	P3B	55	P74
26	P3C	56	MD1
27	P3D	57	MD0
28	P3E	58	NC
29	P3F	59	NC
30	GND	60	GND

Table 9 - Signal description



Pin #	Signal name	Pin #	Signal name
61	MCUVCC	91	MCUVCC
62	P10	92	TRST
63	P11	93	ТСК
64	P12	94	TDI
65	P13	95	TMS
66	P14	96	TDO
67	P15	97	TRACE0
68	P16	98	TRACE1
69	P17	99	TRACE2
70	AVCC	100	TRACE3
71	AVRH	101	TRACECLK
72	AGND	102	P0A
73	P18	103	P0B
74	P19	104	POC
75	P1A	105	P0D
76	P1B	106	POE
77	P1C	107	P0F
78	P1D	108	P68
79	P1E	109	P67
80	P1F	110	P66
81	P28	111	P65
82	P27	112	P64
83	P26	113	P63
84	P25	114	nUBPON
85	P24	115	P61
86	P23	116	P60
87	P22	117	USBVCC0
88	P21	118	UDM0
89	P20	119	UDP0
90	GND	120	GND

MCU External Pin 2 (J2: Pin header)

Table 10 - Signal description

Power jack (J3)

There is a standard 2.1 mm power jack mounted on the board. The power input should be DC +5V.



Pin #	Signal name	Description
1	Power input	+5V
2	GND	GND

Table 11 - Power jack signals and descriptions



Creating a new application

You can create new application as following procedures without an example application.

1 Select Project > Create new project



Figure 6 - Create a new project

2 Click on the + mark on the left side of C in the project template

Create New Pr	oject		×
<u>I</u> ool chain: Proiect template	ABM	•	
Empty pro	ject built executable		
Description:	atu project		
Creates an em	ny protect.		
		OK Car	icel

Figure 7 - Select Create a C project



3 Select main and click OK.

<u>T</u> ool chain:	ABM	-
Project template	s:	
Empty proj	ect	
⊞- asm		
E++		=
DUB		
		*
Description:		
	default tool settings including an empty mai	n.c file.

Figure 8 - Create a C project

Designate a folder where this project is stored and click Save. In this example a project named

NewProject is created.

🔀 Save As	×
🚱 🕞 🗢 📕 « Fujitsu 🔸 Fujitsu 🔸	618T → 49 Search 618T 🔎
Organize 🔻 New folder	₩ • 0
🛧 Favorites 📩 Name	Date modified Type
■ Desktop Downloads Recent Places ■	No items match your search.
Libraries Documents Music Pictures Videos	
🖳 Computer	
🚢 Local Disk (C:) 🖕 🖌	III.
File name NewProject	· · ·
Save as type: Project Files (*.ewp	
Hide Folders	Save Cancel

Figure 9 - save your new project



4 The new project has been created.



Figure 10 - The new project have been created

5 Edit the main program



Figure 11 - Edit the main program



6 Select File > Save Workspace



7 The Save Workspace As... screen is shown. Enter the name of your project, in our case NewProject, which name is same as the name of the project. Click Save.

🔀 Save Workspace As				×
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Organize 🔻 New	folder		BEE -	• 0
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📃 Desktop	📕 Debug		2012/06/22 16:00	File folder
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 ➢ Libraries ➢ Documents ➢ Music ➢ Pictures ➢ Videos 				
🖳 Computer				
🚢 Local Disk (C:)	+ 4	III		F
File name:	NewProject			-
Save as type: V	Vorkspace Files (*.eww)	1	マフ	•
Hide Folders			Save	incel

Figure 13 - Save Workspace As...



8 Click **Project** > **Option** to select the correct options for your project



Figure 14 - Setting the project options

9 Select a device in General Option and the Target tab, click

Category: General Options							
C/C++ Compiler Assembler	Target (Dutput	Library Configur	ation Library	Options	MISRA-C:2004	MIS *
Custom Build Build Actions Linker Debugger	Proces	ssor vai ire	ARM7TDMI	*		ዑ	
Simulator Angel GDB Server IAR ROM-moni I-jet J-Link/J-Trace	Endiar <u>e</u> Lit	wice n mode tle	None	EPU None		- -	
TI Stellaris Macraigor PE micro		BE <u>3</u> 2 BE <u>8</u>					

Figure 15 - Select a device



10 Select Fujitsu MB9BF516R

Category: General Options C/C++ Compiler Assembler Output Convert Custom Build Build Actions Linker Debugger Simulator E	Tarset Output Libs Processor variant © Core A ® Device N	rary Configuration Library Option RM7TDMI	ons MISRA-C 2004 MIS 4 >				
Angel GDB Server IAR ROM-moni I-jet J-Link/J-Trace TI Stellaris Macraigor PE micro RDI JTAGjet STJ TMK	Endian mode © Little © Big © EE32 © BE8	FPU None	Actel AnalogDevices Atmel Cirrus Ember EnergyMicro Epson Faraday	> > > > > > > > >			
34 }	_		Freescale Fujitsu Hilscher Holtek Infineon Intel Marvell	> > > > > > > > > >	Fujitsu MB86R01 Fujitsu MB86R03 Fujitsu MB9EF126 MB9A100 MB9A110 MB9A130	+ + +	Fujitsu MB9BF512N Fujitsu MB9BF512R Fujitsu MB9BF514N Fujitsu MB9BF514R
			Micronas NetSillcon Nuvoton NXP OKI ONSemiconductor Samsung	> > > > > > > > > > > > > > > > > > >	MB9A310 MB9B100 MB9B110 MB9B210 MB9B300 MB9B310 MB9B400	• • •	Fujitsu MB9BF515N Fujitsu MB9BF515R Fujitsu MB9BF516N Fujitsu MB9BF516S Fujitsu MB9BF5165 Fujitsu MB9BF5175
			Socle ST TexasInstruments Toshiha	*	MB9B410 MB9B500 MB9B510 MB9B610	*	Fujitsu MB9BF517T Fujitsu MB9BF518S Fujitsu MB9BF518T

Figure 16 - Select your device

11 Confirm that Fujitsu MB9BF516R is selected.

Category:					
C/C++ Compiler Assembler Output Convert Custom Build Build Actions Linker Debugger Simulator ≣	Target Proce © Ca @ Da	Output ssor va ore evice (Library Configuration iant Cortex-M8 Fujitsu MB9BF516R	Library Options	MISRA-C:2004 MIS
Angel GDB Server IAR ROM-moni I-jet J-Link/J-Trace TI Stellaris Macraigor PE micro	Endia © Li Bi ©	n mode ttle BE32 BE8	FI	9U Ione	v
RDI JTAGjet ST-I INK *				ОК	Cancel

Figure 17 - Confirm your device



- 12 Select and set the linker configuration file (.icf file). Change to Category: Linker.
- **13** If you select the default .icf file for your device, open the **Config** tab and check the **Override default** option.

Seneral Options							F	Factory Setting	js
Assembler Output Convert Custom Build Build Actions Linker Debugger Simulator E Angel GDB Server IAR ROM-moni I-jet J-Link/J-Trace TI Stellaris Macraigor	Confie	Library er configu 2verride \$TOOL! Ec	Input uration f default (IT_DIR\$ lit	Optimizations ile ¥config¥linker¥l	Advanced Fujitsu¥mb9b ne per line)	Output f516r.icf		#define 4	
Macraigor PE micro RDI JTAGjet ST-1 INK					ПК		Cancel		÷

Figure 18 - Confirm your device

14 If you select your original setting, make a copy of the template linker command file from \IAR Systems\Embedded Workbench 6.x Kickstart\arm\config\generic_cortex.icf to your stored folder and rename it as MB9BF516R.icf.

Or, make a copy of the template linker command file from \IAR Systems\Embedded Workbench 6.x Kickstart\arm\config\linker\Fujitsu\mb9bf516r.icf to your stored folder and rename it as MB9BF516R.icf.

15 Change to Category: Linker, open the Config tab and check the Override default option.

ptions for node "Nev	vProject"						×
Category:						[Factory Settings
General Options C/C++ Compiler							
Assembler	Config	Library	Input	Optimizations	Advanced	Output List	#define 🛃 🕨
Custom Build							
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Linker		<u>verride</u>	default				
Debugger	11 ×	\$TOOLK	(IT_DIR)	¥config¥linker¥l	Fujitsu¥mb9b	of516r.icf	
Simulator 📃		Ed	lit				
Angel				1			
GDB Server	<u>C</u> onfig	uration f	ile symb	ool definitions: (c	one per line)		
IAR ROM-moni							~
I-jet							
J-Link/J-Trace							
Macraigor							
PE micro							_
RDI							
JTAGjet							
ST-I INK					OK	Canc	el

Figure 19 - Setting the Linger configuration file



found in the project folder.

General Options								actory set	angs
Assembler Output Convert Custom Build Build Actions Linker Debugger Simulator Angel GDB Server IAR ROM-moni I-jet J-Link/J-Trace TI Stellaris Macraigor	Confie	Library er configu Override \$PROJ_ Ed suration f	Input uration f default DIR\$ lit	Optimizations file	Advanced	Output	List	#define	

Figure 20 - Use the linker in the project folder

17 Select MB9BF516R.icf which you earlier created and click **Open**.

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🔆 Favorites	*	Name	^		Date modified	Туре	
Marktop		🌗 Debug			2012/06/22 16:43	File folder	
鷆 Downloads		settings			2012/06/22 16:43	File folder	
🖳 Recent Places	-	MB9BF516R.i	icf		2012/06/04 15:47	ICF File	
Music Pictures Videos							
Computer							
Local Disk (C:)		-					
	-	• • • • • • • • • • • • • • • • • • •		111		10	

Figure 21 - Select the linker file in your project folder



18 Click **Edit** to edit the linker configuration.



Figure 22 - Edit the linker file



19 The Linker configuration file editor is shown and you should enter the following:

ector Table/	Memory Regions	Stack/Heap Sizes	
.intvec start	0×0		
	Long and the second sec		

Figure 23 - Setting the Vector Table

ctor Table	Memory Regions	Stack/Heap Sizes
	Start:	End:
ROM	0×0	0×0007FFFF
RAM	0×1FFF8000	0×20007FFF

Figure 24 - Setting the ROM/RAM address

Vector Table	Memory Regions	Stack/Heap Sizes
CSTACK	0×400	
HEAP	0x800	

Figure 25 - Setting the Stack/Heap sizes

After you are done with the linker configuration file editor, click on Save.

20 It is now time to build the project by clicking on the **Build** button.



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<u>File Edit View Project Simulator Tools Window Help</u>	-
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Workspace × IAB Information Center for ADM main /	

Figure 26 - Build your project

21 After correcting possible errors in your code it is time to define your debugger as J-Link. Open

Project > Option> Category: Debugger, open the **Setup** tab and change the driver to **J-Link/J-Trace.**

General Options						Facto	ory Settings
Assembler	Setup	Download	Images	Extra Options	Plugins		
Output Convert Custom Build	Drive	r		🔽 Ru	n to		
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Figure 27 - Setting the debugger option



22 Open the Download tab and check Verify download (red circle), then check the Use flash loader(s) (blue circle), because this example uses flash area.

Options for node "New	(Project"
Category: General Options C/C++ Compiler Assembler Output Convert Custom Build Build Actions Linker Debugger Simulator Angel GDB Server IAR ROM-moni I-jet J-Link/J-Trace TI Stellaris Macraigor PE micro RDI	Setup Download Images Extra Options Plugins Attach to program Attach to program Overrify download Suppress download Ouse flash loader(s) Override default board file \$TOOLKIT_DIR\$*config*flashloader*Fujitsu*MB9BF51xRI Edit
JTAGjet STH INK *	OK Cancel

Figure 28 - Debugger download settings

23 Open Category: J-Link/J-Trace and the Connection tab. Select SWD in the Interface option.

General Options		Factory Settings	
Assembler Output Convert	Setup Connection	Breakpoints	
Custom Build	 Communication OBI 	Device 0 - Serial no:	
Build Actions	TCP/IP:	IP address	
Debugger	IP address:	aaabbb.ccc.ddd Serial no:	
Simulator Angel GDB Server IAR ROM-moni I-jet Id ink/I-Trace	Interface JTAG SWD	JTAG scan chain JTAG scan chain with multiple targets TAP number: 0 Scan chain contains non-ARM devices Preceeding bits: 0	
TI Stellaris	📃 🔲 Log communic	ation	
Macraigor	\$PROJ_DIR\$¥cspycomm.log		

Figure 29 - Setting the debug interface



24 Open the Setup tab and set the SWD speed. Click OK.

Category:							Factory Setting
C/C++ Compiler							
Assembler	Setup	Connection	Breakpoints	1			
Output Convert	Bes	et	r broanpointo				
Custom Build	No.	nrmal			•	0	
Build Actions						12	
Debugger	JTr	AG/SWD spe	eed		Clock setup		
Simulator =	0	Aut <u>o</u>	20	1000	0.001	72.0	
Angel		Initial	02	KHZ	CPU clock:	12.0	MHz
GDB Server	۲	Fixed	4000	kHz	SWO clock:	🔄 Auto	
IAR ROM-moni	0	<u>A</u> daptive				2000	kHz
I-jet		1/CTD					
J-Link/J-Trace	-EII	W/EIB					
TI Stellaris		Prefer ETB					
Macraigor							
PF micro							

Figure 30 - Setting the debug speed

25 The project options have now been set and you can start C-SPY and debug your program.

🔀 NewProject - IAR Embedded W	orkbench IDE			
<u>File Edit View Project Tools</u>	<u>W</u> indow <u>H</u> elp		-	
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Workspace ×	IAR Information Center for ARM main.c			

Figure 31 - Start debugging



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Troubleshooting

If you are unable to find the cause of a problem, try resetting the evaluation board by using the reset button on the board. Then restart the C-SPY Debugger in the IAR Embedded Workbench IDE. You can also try disconnecting and reconnecting the power to the evaluation board, pressing the reset button and then restarting C-SPY.

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