

Getting Started

SQM4 EasyBoard Development Kit



Contents

1	Hardware	2
1.1	Easyboard Base Board	3
1.2	SQM4-K70 Module	4
1.3	FRD43040I-D Display	5
1.4	Power cable	6
1.5	Further hardware	6
2	Software	7
2.1	Install a development environment	7
2.2	Install MQX RTOS	7
2.3	Install EasyBoard BSP	7
2.4	Build EasyBoard BSP	7
2.5	Install eGUI free graphics library	8
2.6	Start with the demo applications	9
2.6.1	Bare metal	9
2.6.2	MQX	9
2.6.3	MQX with eGUI	13

1 Hardware

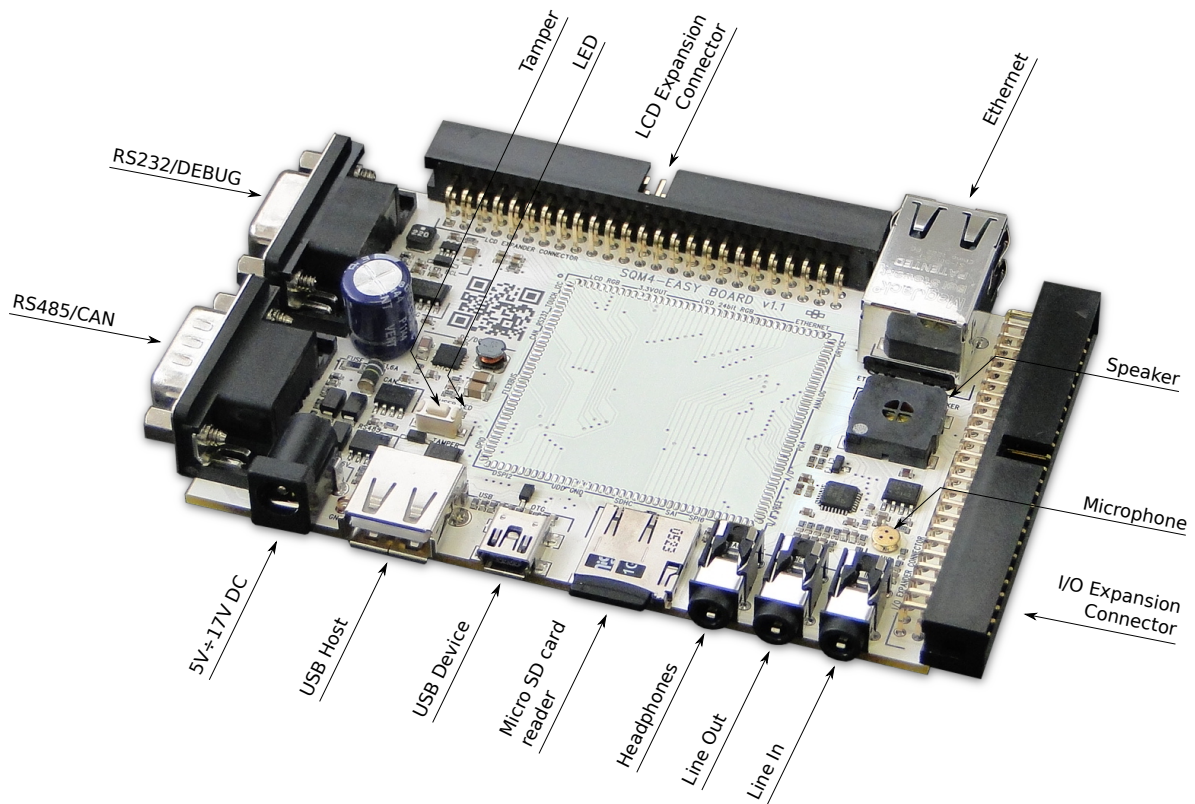
EasyBoard Development Kit consists of three main parts:

1. Easyboard base board
2. SQM4-K70 module
3. FRD43040I-D display

1.1 Easyboard Base Board

Two-layer base board provides wide range of peripherals. Hardware documentation can be downloaded from <http://www.sqm4.com/easyboard-development-kit>:

- http://www.sqm4.com/image/data/products/easy_board/doc/SQM4_EasyBoard_datasheet.pdf - EasyBoard datasheet,
- http://www.sqm4.com/image/data/products/easy_board/doc/SQM4_EASY_BOARD_sch.pdf - EasyBoard schematic.

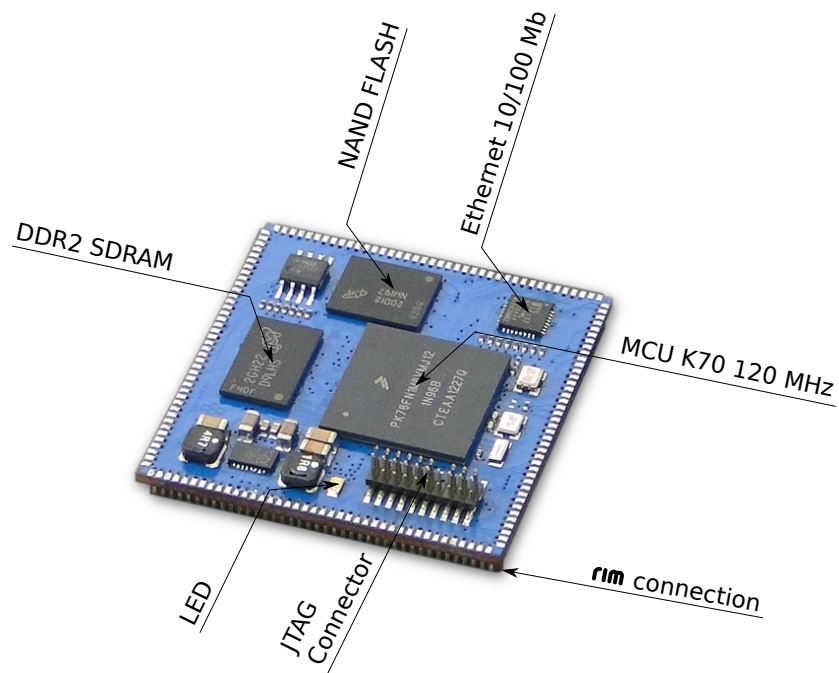


1.2 SQM4-K70 Module

The brain of the board takes place in the SQM4-K70 module. Its website: <http://www.sqm4.com/sqm4-k70-kinetis-module>

- http://www.sqm4.com/image/data/products/sqm4_modules/doc/SQM4_K70_datasheet.pdf - Module datasheet.

Connection to the base board is realized by robust **rim** connection - the frame on the bottom side of the module.

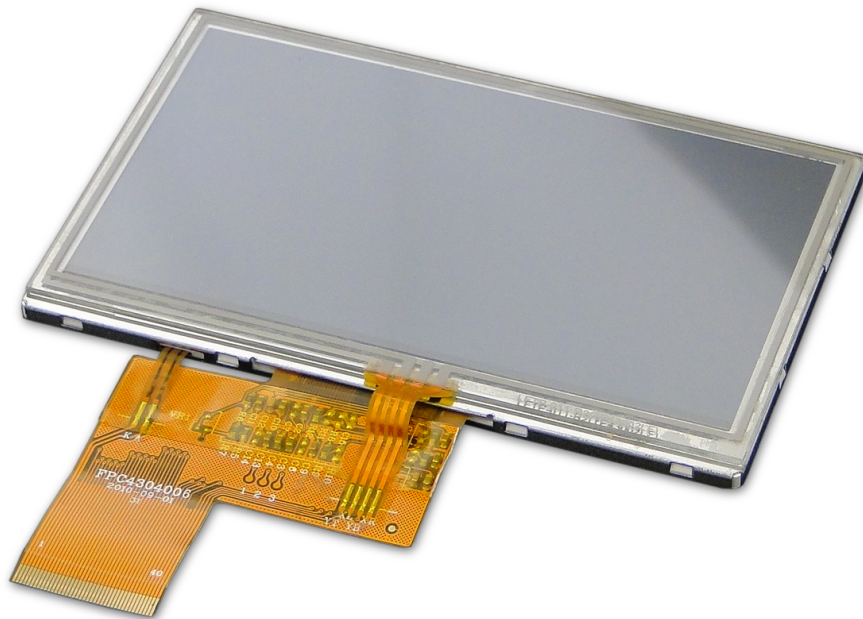


1.3 FRD43040I-D Display

Graphical user interface can be presented on 4.3" color LCD display with resolution 480×272 px. More information on <http://www.sqm4.com/frd43040i-d-rgb-tft-lcd-4.3-inch-embedded-display>:

- http://www.sqm4.com/image/data/products/lcd_frida/doc/FRD43040I-D.pdf - FRD43040I-D display datasheet,
- http://www.sqm4.com/image/data/products/lcd_frida/doc/HX8257.pdf - HX8257 driver datasheet.

Connection to the base board is realized by standard ZIF connector on the bottom of the board. This provides easy replacement by any compatible LCD display (see <http://www.sqm4.com/products/lcd-displays>).



1.4 Power cable

EasyBoard Development Kit is usually shipped with simple power cable. Use any power supply providing direct current from 5V to 17V.

In some cases, the kit is shipped with an AC/DC Wall Adapter (<http://www.sqm4.com/acdc-adapter>).

EasyBoard Development Kit can also be powered from USB cable (USB Device connector).

1.5 Further hardware

To reprogram and debug applications on your EasyBoard, JTAG/JTRACE emulator is needed. For their interconnection, ARM JTAG20 Cable is used (<http://www.sqm4.com/jtag-cable20>). Often there is also a need of reduction (<http://www.sqm4.com/jtag-adapter>). These are standard parts of programmer's equipment though and thus they are not a part of EasyBoard Development Kit.

2 Software

To start development with EasyBoard Development Kit, the following steps are recommended:

1. Install a development environment
2. Install MQX RTOS
3. Install EasyBoard BSP
4. Build EasyBoard BSP
5. Install eGUI free graphics library
6. Start with the demo applications

2.1 Install a development environment

Demo applications mentioned below contain project files for *IAR Embedded Workbench for ARM*. This can be downloaded from <http://www.iar.com/en/Products/IAR-Embedded-Workbench/ARM/>. Provided projects should also be compatible with *CodeWarrior Development Studio* (http://www.freescale.com/webapp/sps/site/homepage.jsp?code=CW_HOME). ELNICO s.r.o. can provide limited support for development under *IAR*.

2.2 Install MQX RTOS

Most of demo applications are developed under *Freescale MQX*. It is a free real-time operating system.

1. Download version 4.0 or higher from http://www.freescale.com/webapp/sps/site/prod_summary.jsp?code=MQX&fsp=1&tab=Design_Tools_Tab.
2. Install it to C:\Freescale\Freescale_MQX_4_0.

2.3 Install EasyBoard BSP

Board support package and related libraries ported to EasyBoard are required.

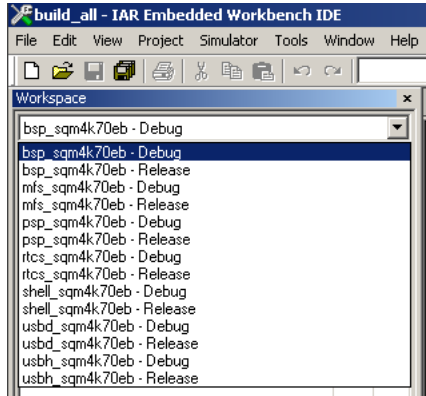
1. Download archive from http://www.sqm4.com/image/data/products/easy_board/code/MQX4_sqm4k70eb.zip.
2. Extract the content and copy all the subdirectories of the archive's root directory (*MQX4_sqm4k70eb*) to C:\Freescale\Freescale_MQX_4_0 so that the directories merge with the original directories installed in the previous step.

2.4 Build EasyBoard BSP

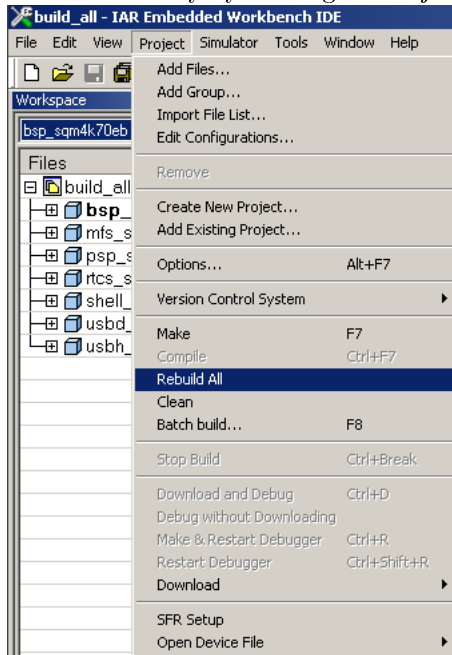
The board support package needs to be built.

1. Open the IAR project file C:\Freescale\Freescale_MQX_4_0\config\sqm4k70eb\IAR\build_all.eww.

2. In the Workspace subwindow, select *bsp_sqm4k70eb - Debug* from the combo box.



3. Build the library by clicking on *Project – Rebuild All* in the main menu.



4. Do the same for (in given order) Debug variants of *psp_sqm4k70eb*, *mfs_sqm4k70eb*, *shell_sqm4k70eb*, *rtcs_sqm4k70eb*, *usbh_sqm4k70eb* and *usbd_sqm4k70eb*.
5. Build all the libraries for Release, keep the order.

2.5 Install eGUI free graphics library

Preprogrammed demo application uses free *Freescale eGUI* graphics library (sometimes also called *D4D*).

You can download the library from the official source:

1. Download the library from <https://www.freescale.com/webapp/search/Serp.jsp?QueryText=eGUI&assetIdResult=&fsrch=1&sessionChecker=gGFBQVqGXg0Lg5LscP4qWH2cTT4xhyWcLdhP1pZJl1GWft2zfRy!-1502558406!1356180004859&attempt=0&showCustomCollateral=false&RELEVANCE=true&fromTrng=false&showAllCategories=false&fromMobile=false&isResult=false&isFromFlex=false&isTree=false&pageSize=25&fromASP=false&isAdvanceSearch=false&getTree=false&fromPSP=false&lastQueryText=>


```
eGUI&iteration=1&assetLocked=false&assetLockedForNavigation=false&fromCust=false&getFilter=
false&fromDAP=false&fromWebPages=false&getResult=false&isComparison=false&SelectedAsset=
Downloads.
```

2. Install it to C:\Freescale\eGUI.

Second approach (recommended) is to download it from SQM4 website:

1. Download archive from http://www.sqm4.com/image/data/products/easy_board/code/SQM4K70EB_ElnicoDemo.zip
2. Extract it to C:\Freescale\eGUI.

The archive at SQM4 website contains also the source code of preprogrammed demo application. The library is contained in the D4D directory.

2.6 Start with the demo applications

A wide range of demo applications is available. They can be divided into three groups:

1. Bare metal
2. MQX
3. MQX with eGUI

2.6.1 Bare metal

Bare metal codes provided by Freescale can be, in case of IAR development tool, located in directories under `<install_directory>\arm\examples\Freescale\Kinetis_K70\examples`, where `<install_directory>` is the installation directory of IAR, e.g. `C:\Program Files\IAR Systems\Embedded Workbench 6.4`. While the source codes are located in subdirectories of the `src\` directory, ready-to-use workspace files are located under `build\` directory.

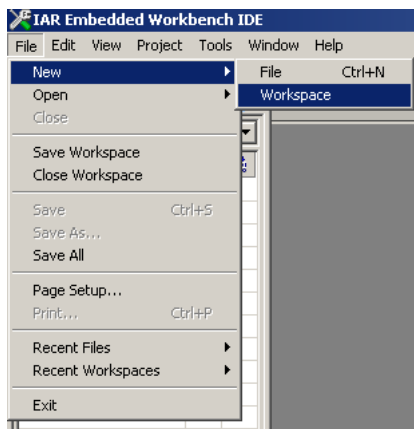
Archive of all these codes can be also downloaded from SQM4 website: http://www.sqm4.com/image/data/products/easy_board/code/DemoSQM4_K70.zip. Besides of the codes, it contains a useful Quick Start Guide (by Freescale) explaining more on the bare metal demos, including guide for Code Warrior.

2.6.2 MQX

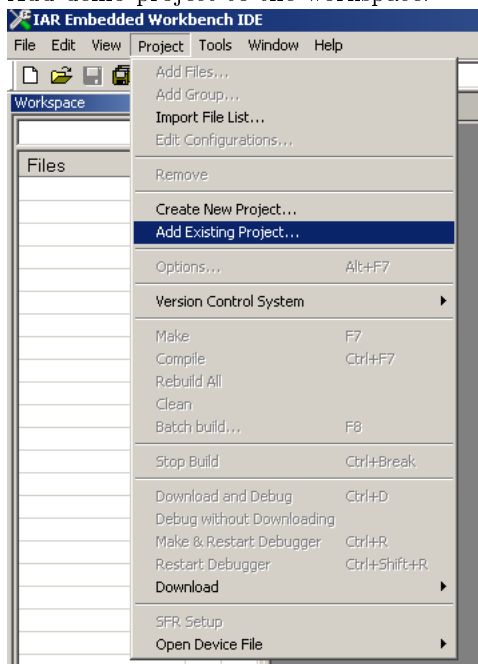
Demo applications for MQX RTOS are located in the MQX installation directory (`C:\Freescale\Freescale_MQX_4_0`) under `demo\` and several places like `rtcs\examples\`.

Here is an example of starting with an MQX demo application under IAR:

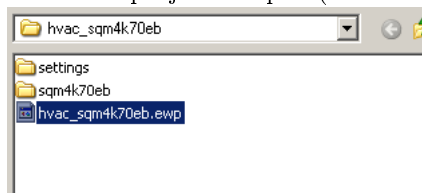
1. Open IAR Embedded Workbench.
2. Create new workspace.



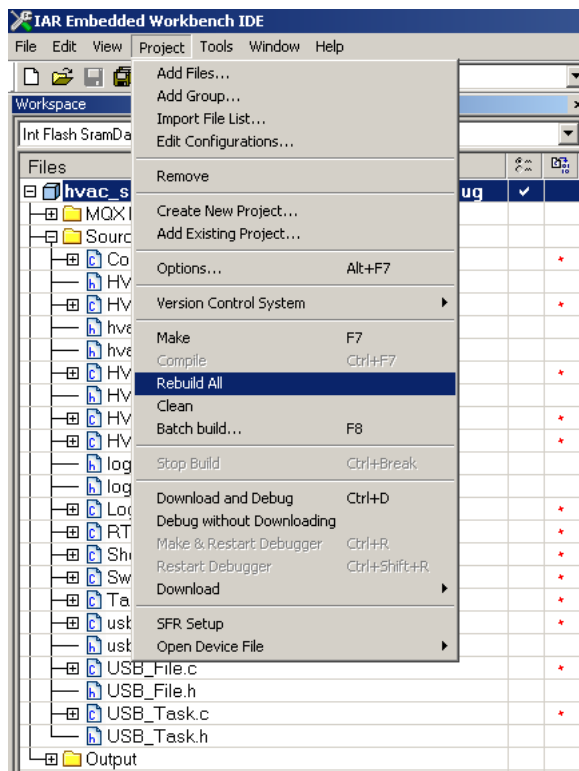
3. Add demo project to the workspace.



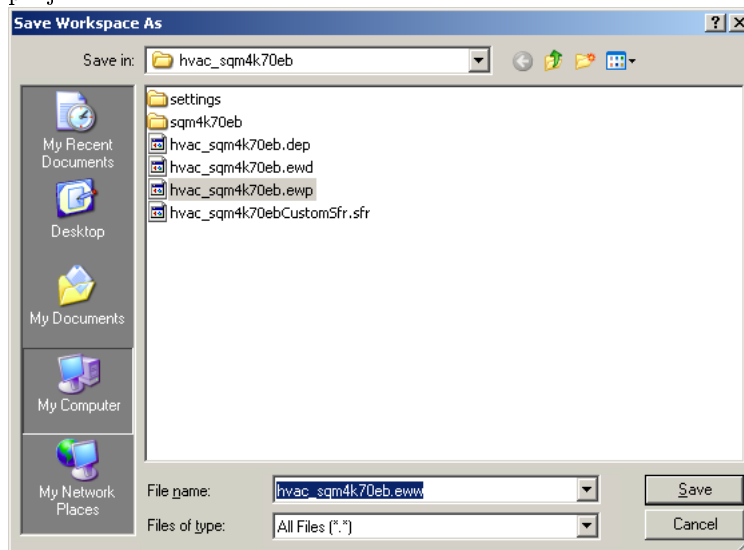
4. Select the project to open (here demo\hvac\iar\hvac_sqm4k70eb\hvac_sqm4k70eb.ewp).



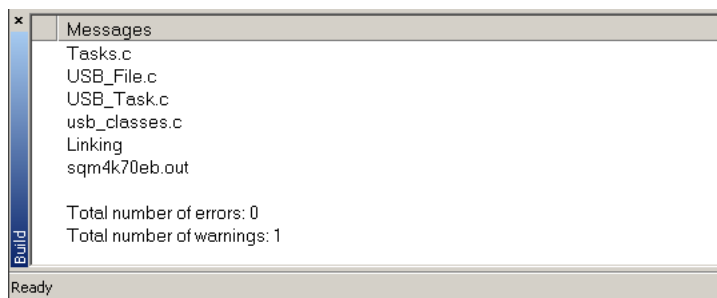
5. Build the project.



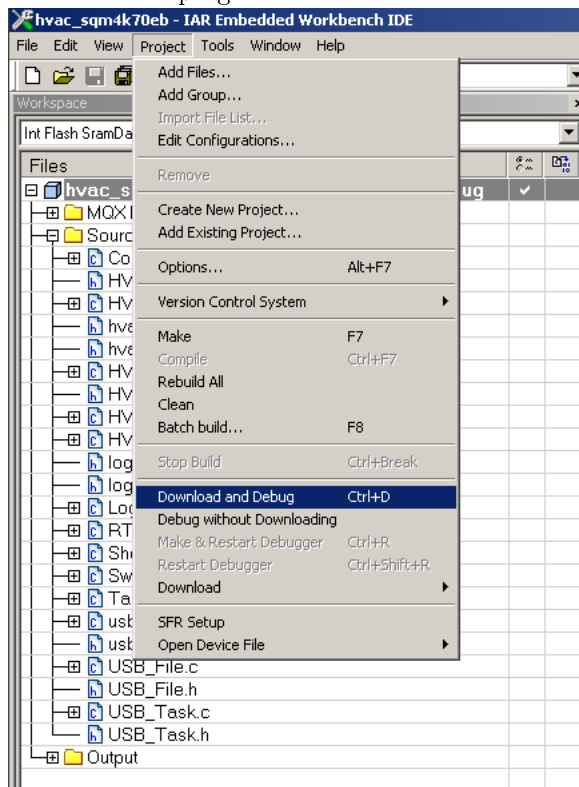
6. Before the first build, you have to save the workspace. Save it to the same directory as the project file.



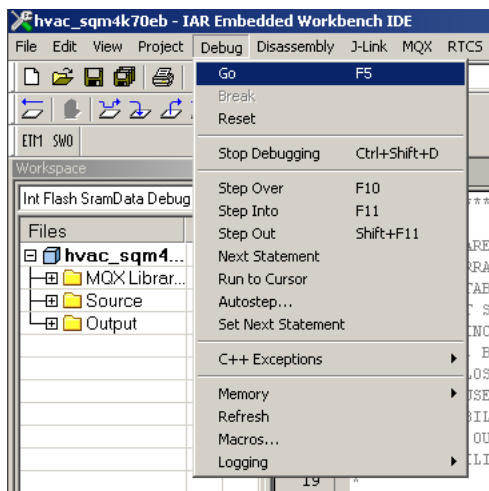
7. The project should build without errors.



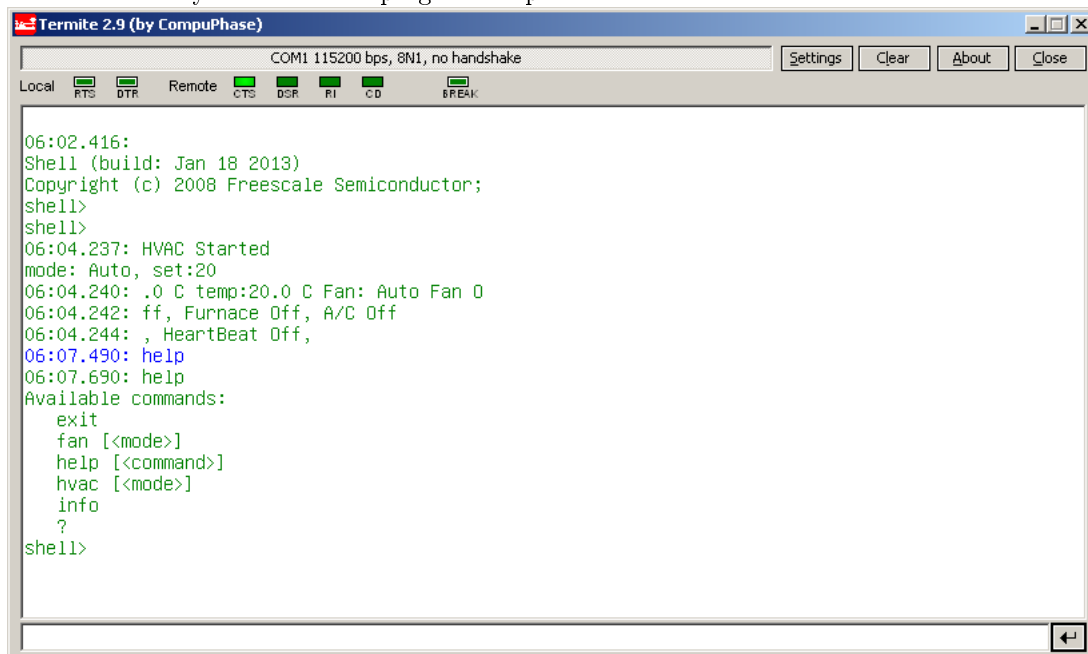
8. Connect the JTAG/JTRACE emulator to both PC and EasyBoard.
9. Connect the serial cable to the RS232/DEBUG port.
10. Start any terminal (e.g. Hyperterminal) and configure it to the proper PC port. Choose 115200 bps, 8 data bits, 1 stop bit, none parity, none flow control.
11. Power on the board.
12. Download the program to the device and start debugging.



13. To run the program, press *F5*.



14. In the terminal you can see the program output.



2.6.3 MQX with eGUI

There is one demo application provided by ELNICO itself. That is the application preprogrammed at the time of delivery. Its binary file can be downloaded from http://sqm4.com/image/data/products/easy_board/code/eGUI_Demo_d.zip. The application requires Micro SD card with special content to be present in the slot. The content can be downloaded from http://sqm4.com/image/data/products/easy_board/code/SDcard.zip.

The source code is available at http://www.sqm4.com/image/data/products/easy_board/code/SQM4K70EB_ElnicoDemo.zip together with D4D library. This is what you probably already downloaded and extracted to C:\Freescale\eGUI in the chapter 2.5. To start with the demo, open the workspace file C:\Freescale\eGUI_Official_Demos\EGUI_Demo\SQM4K70_EB\IAR\EGUI_Demo.eww.

Please note this is a development version, some parts may not be properly functional and some code may not be very clear. Its only purpose is to demonstrate some of EasyBoard's peripherals.