FUJITSU

STARTERKIT
SK-86R03 'JADE-L'

USERS GUIDE

Revision 1.03

01.06.2010

Revision History

Rev. No.	Date	Comments/Changes
1.00	June 2008	First version
1.01	March 2010	Hhö, updated basic features
1.02	April 2010	AvT format & lingual cleanup, added software descriptions and photos
1.03	June 2010	Tk chapter example code and GHC added

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1 Introduction

1.1 Foreword

The Fujitsu Jade-L Starterkit is a stand-alone system that makes it easy to evaluate and demonstrate many of the features of a MB86R03 'Jade-L' graphics system. The product comprises of the following:

- the SK-86R03-01 Jade-L Evaluation board
- a JTAG debugger mini-board
- a TFT display, 800x480 pixel, others are available on request (Glyn/EDT family concept)
- serial cable
- power supply
- CD containing IAR Embedded workbench, additional software & documentation

Fujitsu has a number of graphics controllers for embedded systems which are organized in seperate device families. The graphics controllers of a specific family are software compatible and therefore an evaluation system will have a specific software package, manual etc. depending on the device family.

All peripheral functions are available on external pin-headers in order to aid design work and to test user applications efficiently. For some resource functions, additional hardware is already present on the board (e.g. Ethernet and UART transceivers, LEDs, buttons, etc).

IAR Embedded Workbench

The 'IAR Embedded Workbench' is a set of development tools for building and debugging embedded applications using assembler, C and C++. It provides a completely integrated development environment including a Project Manager, Editor, build tools and a Debugger. In a continuous workflow, you can create source files and projects, build applications and debug them in a simulator or on hardware. To get started quickly, a number of example projects and templates are available.

GHC2.0 (Graphic Human Interface Creator Version 2.0)

Creating modern Human Machine Interfaces (HMI) can be a challenging and time consuming task for programmers The Jade-L Embedded Starterkit comes with an evaluation version of Fujitsu's new 'Graphic Human Interface Creator Version 2.0'. With this software, any user without programming experience can design Human Machine Interfaces (HMI) and automatically generate source code for an application which runs on the Fujitsu MB86R03 'Jade-L'. This tool greatly reduces development time and permits creating professional HMIs for embedded products.

Other related documents such as hardware manuals, software API descriptions etc. are available and should always be used in addition to this manual (see appendix).

Be sure you have the latest information available – check our websites for updates and last minute information:

Support and updates:
http://www.fujitsu.com/emea/services/microelectronics/gdc/gdcdevices/mb86r03-jade-l.html

Fujitsu Microelectronics Europe website : http://www.fme.fujitsu.com

Technical website : http://www.fujitsu.com/emea/services/microelectronics/gdc/

1.2 Key Interfaces Evaluation Board

▸ 2x Digital RGB outputs on pinheader available

▸ 1x Digital RGB output on 40pol FFC connector (for GLYN TFT family concept)

▸ Dual CAN interface on pinheader available

▸ RJ45 Ethernet interface

▸ 1x RS232 UART interface on SUB-D connector, 1x on pinheader available

▸ SD-Card interface on pinheader available

▸ Dual Video Input (ITU656) on pinheader available

▸ USB interface

▸ JTAG interface

▸ MB86R03 'Jade-L' mounted

▸ DDR2 memory (128MB) onboard

▸ 32MB mirror bit Flash Memory

▸ ADCs for easy use prepared

▸ PWM / I2C and SPI interfaces on pinheaders available

1.3 Key Interfaces Extension Board (optional extra)

▸ 2x Digital DVI Output

▸ 2x CVBS Video input

2 Components Checklist

Check that you have the following components after unpacking the Jade-L Starterkit:

- ❑ The SK-86R03 evaluation board
- ❑ Segger JTAG mini-board
- ❑ Panel with FFC cable
- ❑ Serial cable with adapter for board
- ❑ Power supply
- ❑ IAR Embedded Workbench CD
- ❑ User Guide

* Please note that the latest manuals and software are available from the Fujitsu support website:

http://www.fujitsu.com/emea/services/microelectronics/gdc/

3 Board Connections

3.1 Power supply

A power supply, capable of supplying about 1500 mA at 9-12V DC. **Note that the power connector polarity must be + in the core and - on the sleeve.**

Power supply
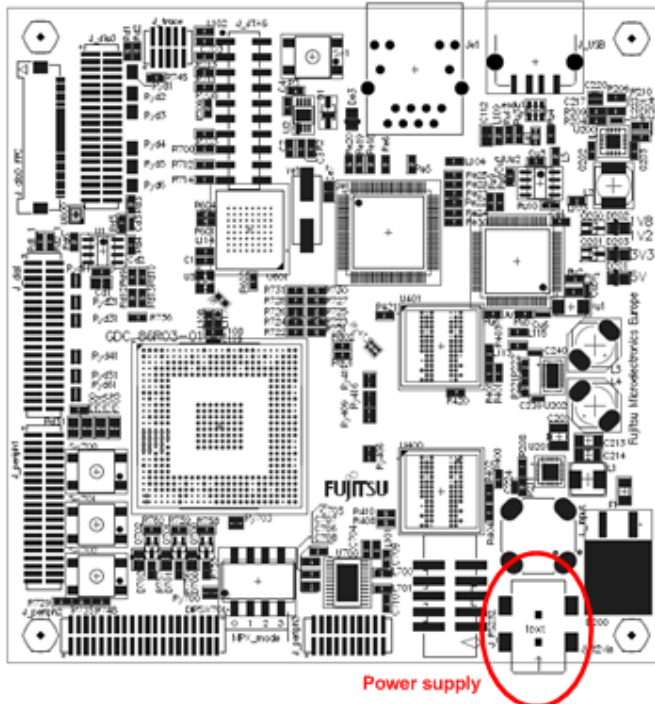
3.2 Serial connection

The following steps are necessary to communicate with the evaluation system.

1 Start the terminal program software on the PC
2 Configure the program to use the port settings as shown below:
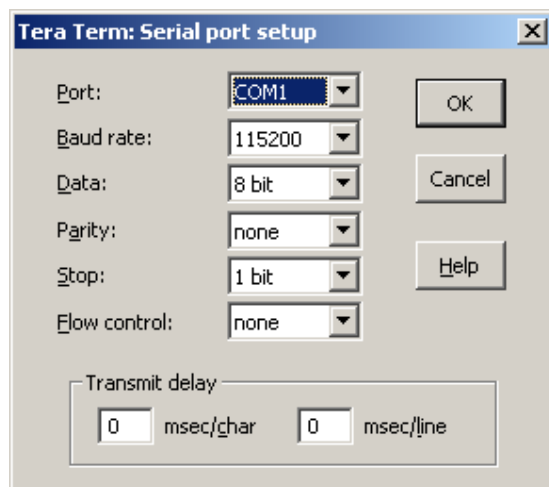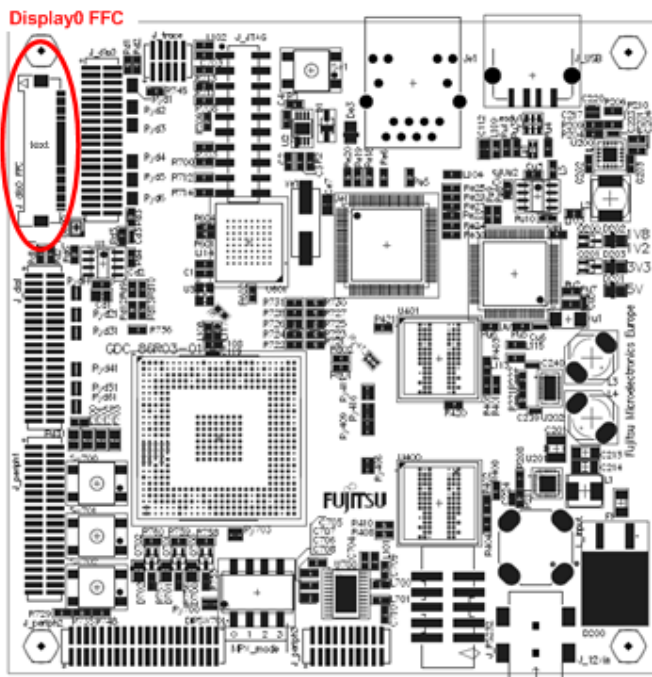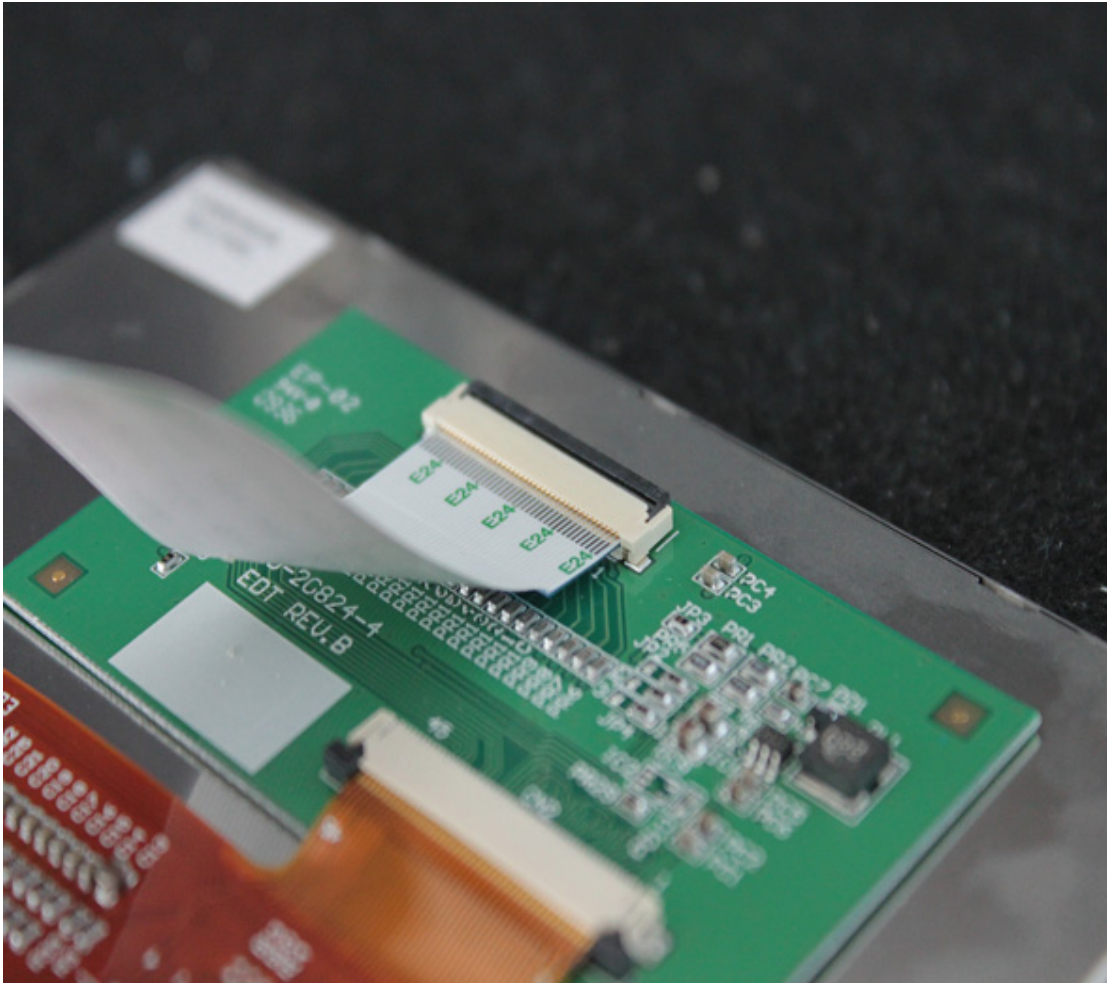

3 Connect the serial adapter and cable to the serial jack

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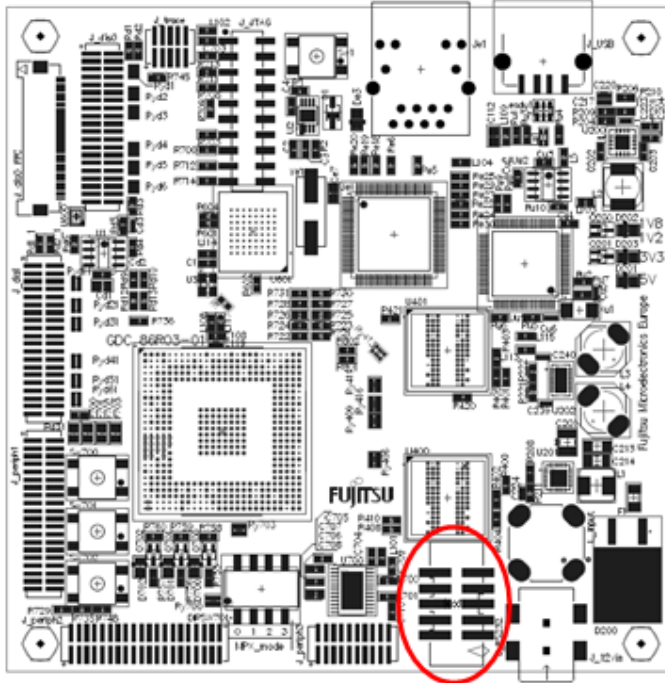
Serial connection

3.3 Display

The board is shipped with a 40 pole FFC connector display plus the appropriate flat cable.
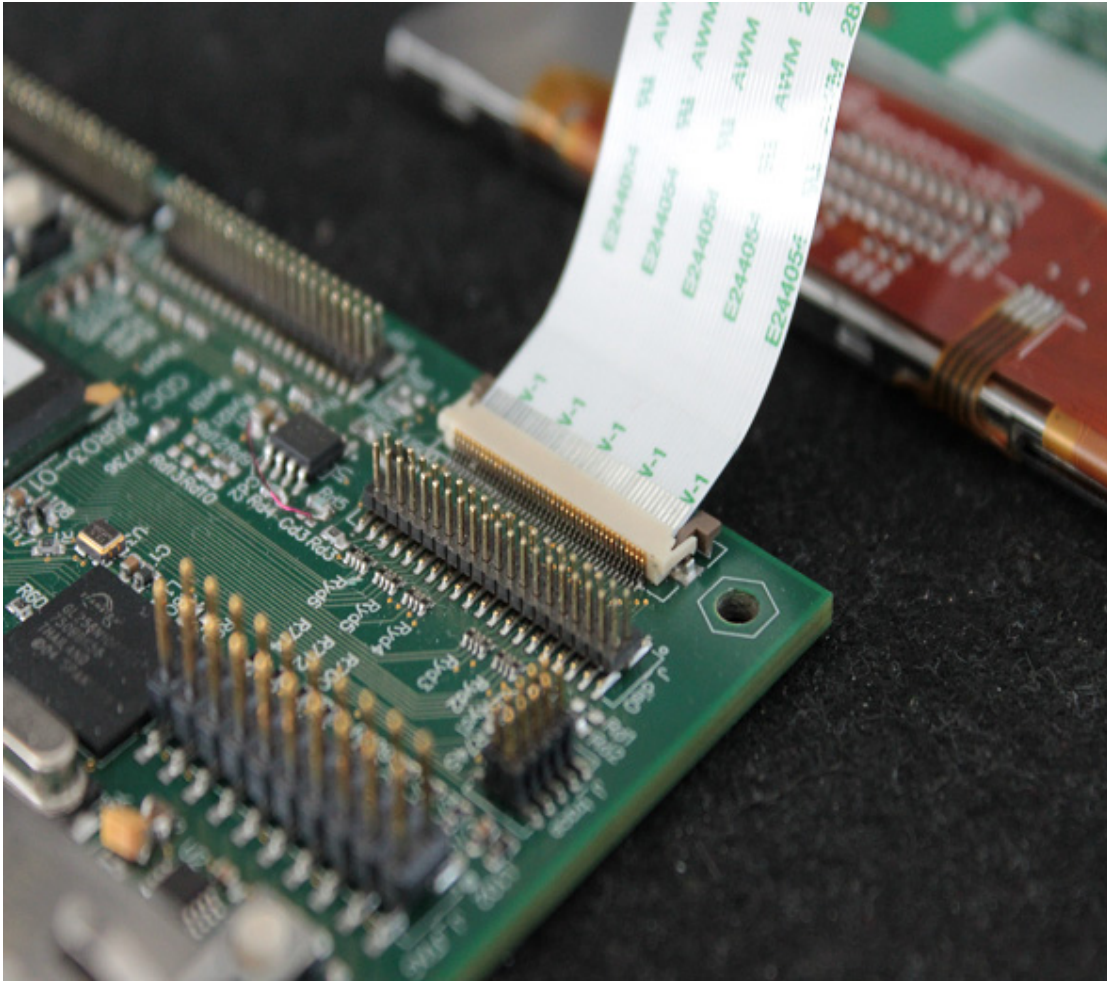

Display0 FFC

The following steps are necessary to connect the display with the evaluation system.

1   Connect the flat cable to the display

2   Connect the other side to the base board, please be aware of that PIN1 of board
    matches to PIN1 on the display !!!!
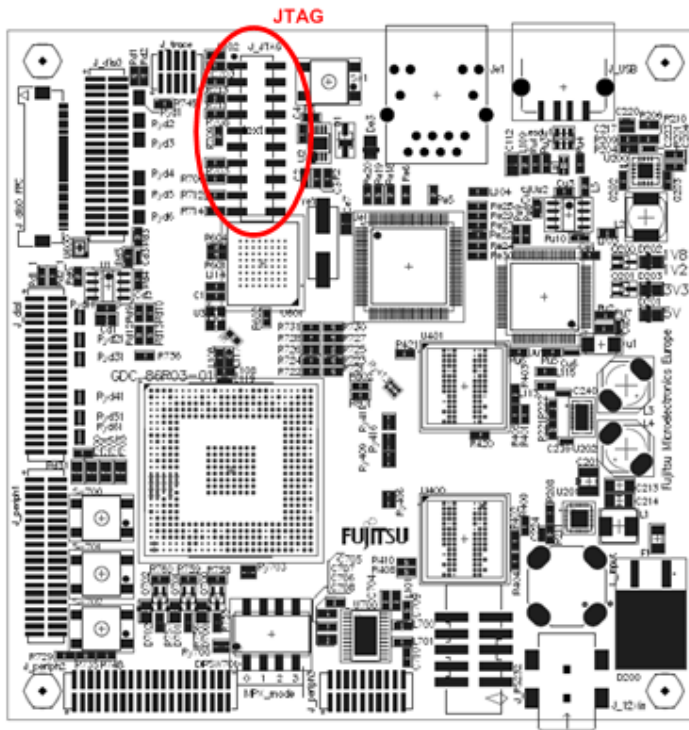   Both connectors have upper contact, so FFCs isolated side is turn to bottom.

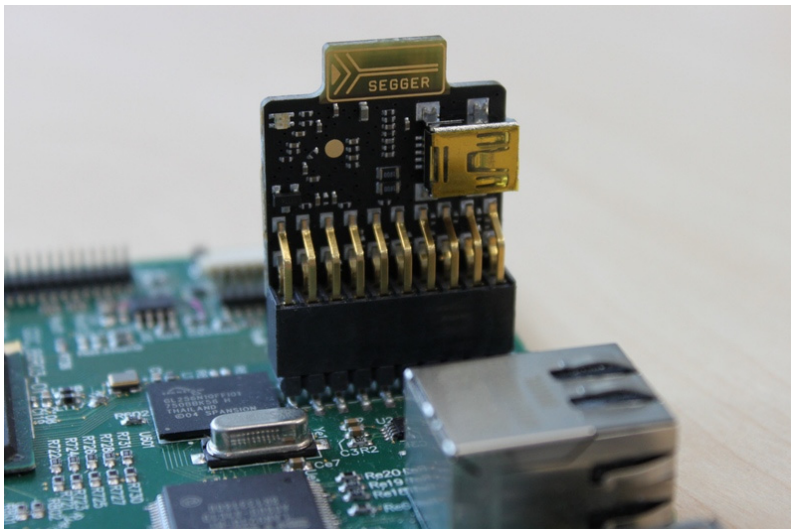All other signals are available on pin headers to connect other displays.
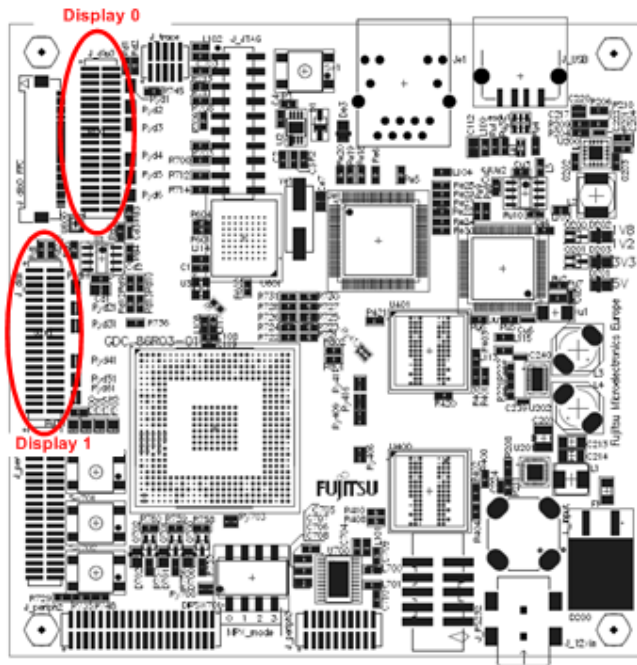
3.4 JTAG

The board is populated with a jack compatible to the standard ARM JTAG interface pinout. Therefore you can connect different JTAG Debuggers to the board.
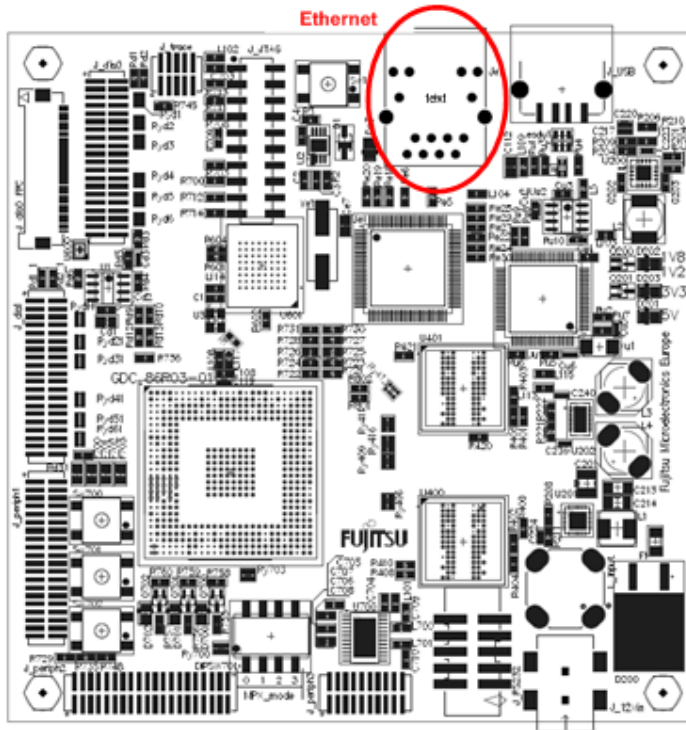

A Segger J-Link Arm Lite adapter is included. It is connected as shown in the picture below.

3.5 Ethernet

It is possible to establish a connection with a local area network. This allows you to connect to a TFTP server to download software or to mount NFS filesystems. This has some performance benefits compared to JTAG especially when downloading larger files.

The following requirements exist to be able to connect to a TFTP server:

- ❑ A PC with:
  - ○ a free COM port and RS232 cable
  - ○ a free ethernet (network) connection configured to use an APIPA IP address (169.254.148.xxx, whereby xxx may not be 44 or 45, which are reserved for the Jade-L Starterkit!)
  - ○ a terminal program (e.g. Tera Term Pro, which is available as freeware in the Internet at http://ttssh2.sourceforge.jp/)
  - ○ a TFTP server installation (available as freeware in the Internet e.g. tftpd32 from http://tftpd32.jounin.net/)
- ❑ A switch or hub
- ❑ The Jade-L Evaluation Board
- ❑ Monitor
- ❑ Network cables, VGA or DVI cables

3.5.1 Software Setup – TFTP Server

A TFTP server (software) running on your PC is required to transfer files between your PC and the Jade-L Evaluation Board via the Ethernet interface.

Install the TFTP server software and configure it to use a local directory on the PC where files to be run on the Jade-L Evaluation Board are stored. Configure the program settings so
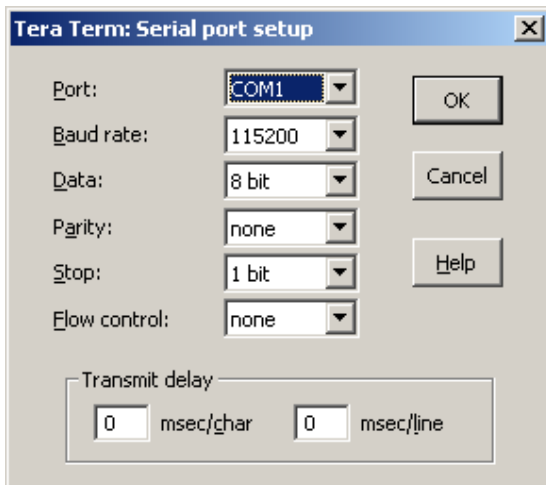
that the timeout values are not too strict (e.g. 30 seconds timeout). The following picture is an example of a configuration.
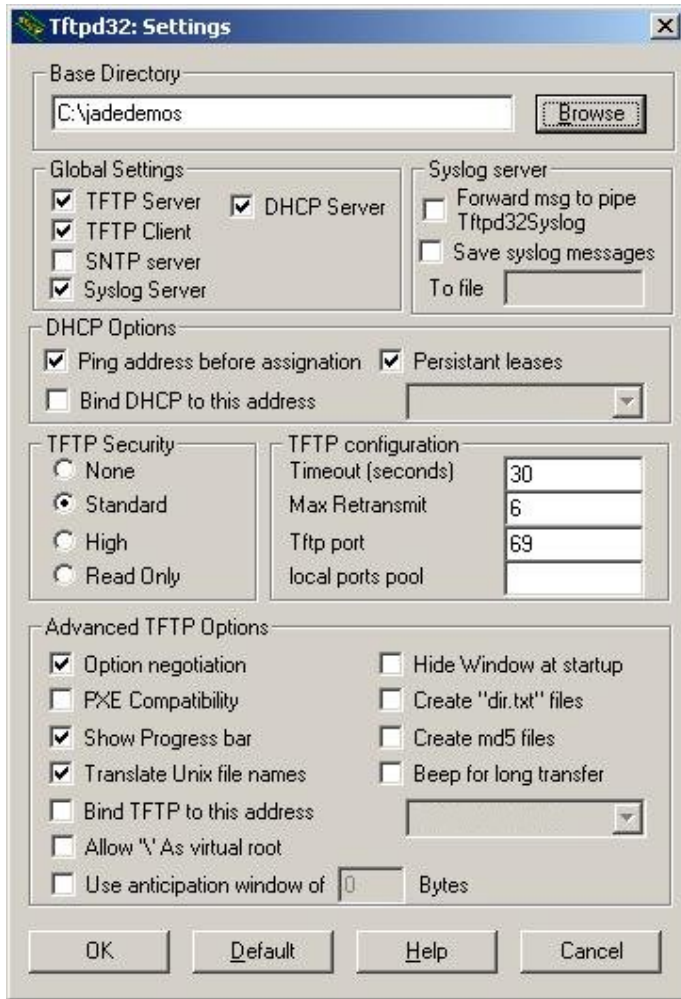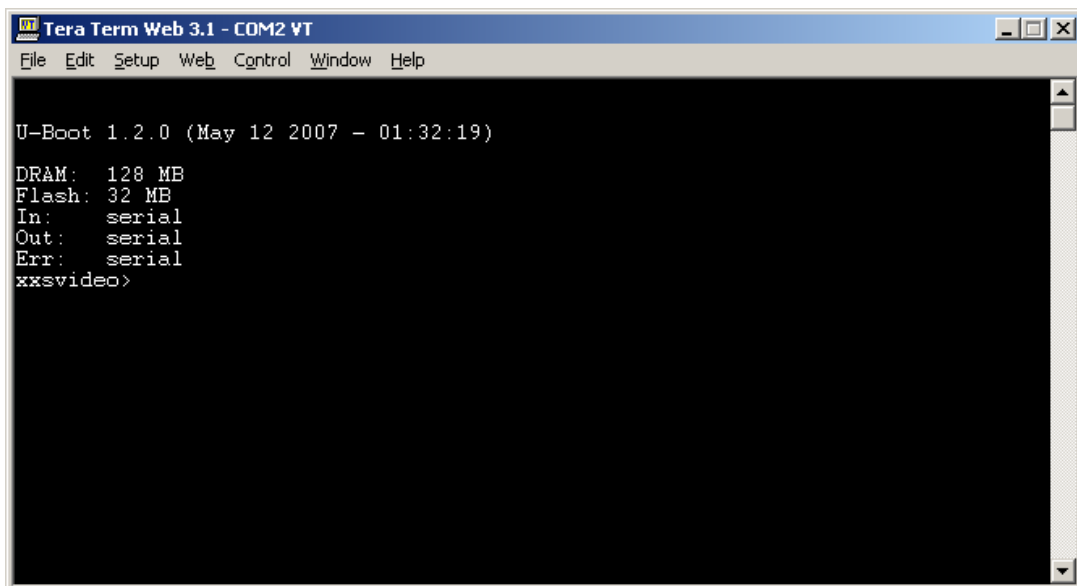

3.5.2 Software Setup – Terminal Program

The following steps are necessary to communicate with the evaluation system.

1   Start the terminal program software on the PC.

2   Configure the program to use the port settings as shown below:

3   Configure the terminal program settings so that the timeout values are not too strict (e.g. 30 seconds timeout)

4   Unplug and then reconnect the power supply to the Jade-L Evaluation Board. The LEDs on the board will illuminate and the terminal software window (console) should be updated by the Jade-L Evaluation Board firmware. It should show a screen similar to the one shown below.


```
U-Boot 1.2.0 (May 12 2007 - 01:32:19)

DRAM:  128 MB
Flash: 32 MB
In:    serial
Out:   serial
Err:   serial
xxsvideo>
```

Important: The actual messages shown may differ to those shown here. However, it is important that a message from U-Boot is shown! If not, please refer to the Troubleshooting section in this manual.

5   Type the 'printenv' command to see the complete current environment (setup).

6   Check your TFTP server setup (IP address) and if necessary modify your ethernet connection to the Jade-L Evaluation Board by changing the **environment variables** as indicated by the Linux commands shown below:
    setenv **gatewayip** 169.254.148.45
    setenv **serverip** 169.254.148.45
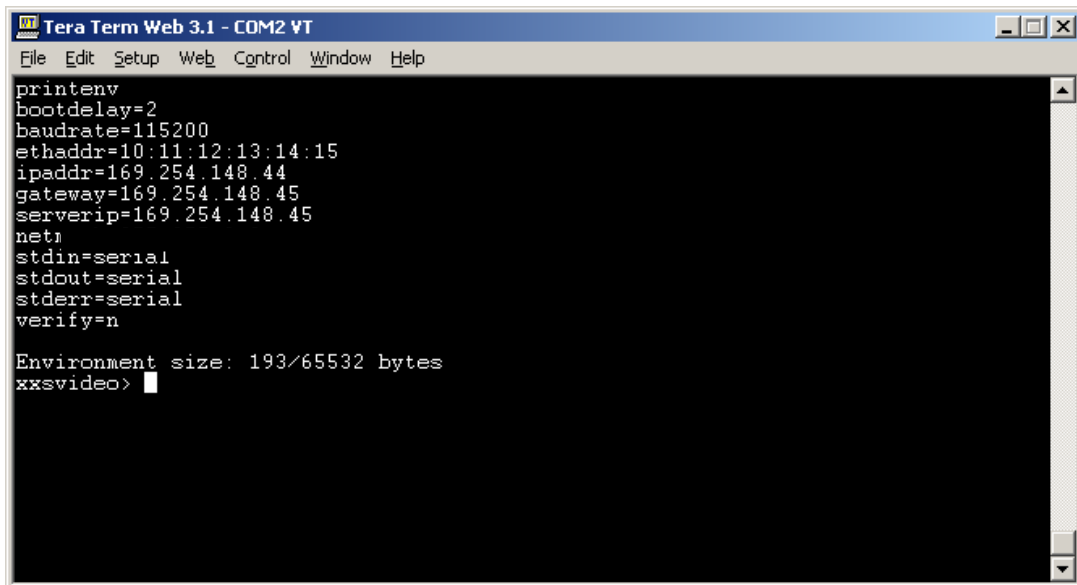   setenv **ipaddr** 169.254.148.44

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setenv **netmask** 255.255.0.0
saveenv

Note:
gatewayip and serverip represent the IP address of the TFTP server on the evaluation board. If you can not change the IP address of your PC's network card, change the ipaddr environment variable so that the Jade-L Evaluation Board is reachable to the TFTP server on the PC (i.e. within the same subnet mask) e.g. 192.168.0.100/255.255.255.0 if your PC's network card is using e.g. 192.168.0.x/255.255.255.0)

7   Your final configuration should be similar to that shown below:

8   Check the ethernet connection between the hardware by pinging the IP address of the TFTP server. Enter ping <IP address of TFTP server>. If everything is OK, the console will display a message such as 'Board is alive'

9   Downloading software from the PC to the evaluation board:
   ❑ Copy the plain binary file to the directory on your PC that is exported by your TFTP server.
   ❑ Download the software to the Jade-L Evaluation Board by typing:
   tftp 0x40000000 software_name.bin
   go 0x40000000

   0x4000_0000 is the address the software is loaded to. You can change this.
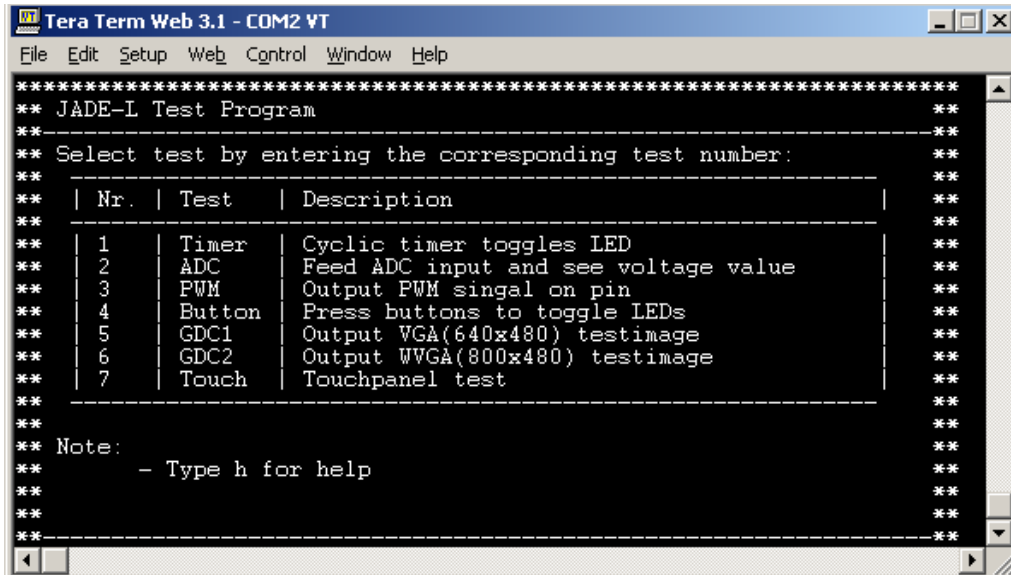   go 0x40000000 jumps to this address and starts execution.
   Please note that the system is already initialized by the Uboot loader. You must therefore jump over your initialization to prevent errors. Just check your linker output to get the right entry point address (e.g. main) .

4 IAR installation

Insert the installation CD. The CD contains all the software you need to get your development project up and running. The installation program starts automatically.

5 IAR basic example code

The example project shows the basic use of the Interrupt Controller, I2C, Timer, PWM, ADC and GDC. It starts by blinking LED D700 and shows a startup screen on the display. The different tests can be selected by the command line interpreter running on the serial port (115200 baud rate). Every test can be cancelled by pressing any key inside the terminal.
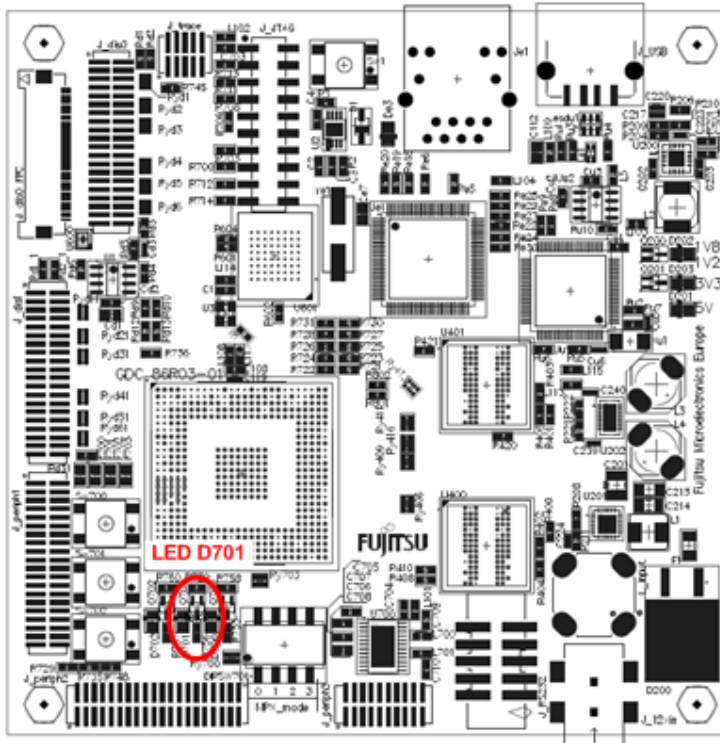

This example can be selected and downloaded within the IAR Embedded Workbench shipped with this board. More information can be found inside the Getting Started Guide (GS-IAR-JADE-L.pdf) on the DVD.

5.1 Timer test

Press '1' to enter the Timer test program.

This example toggles LED D701and shows the basic interrupt handling.
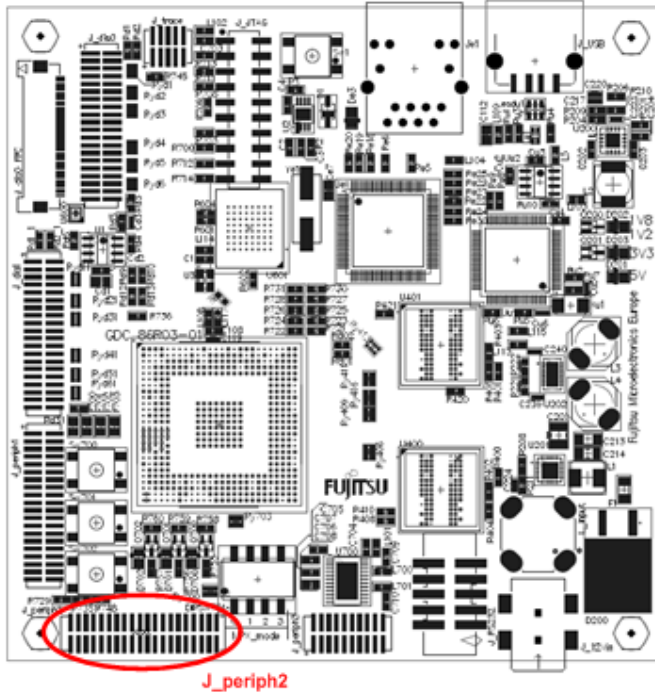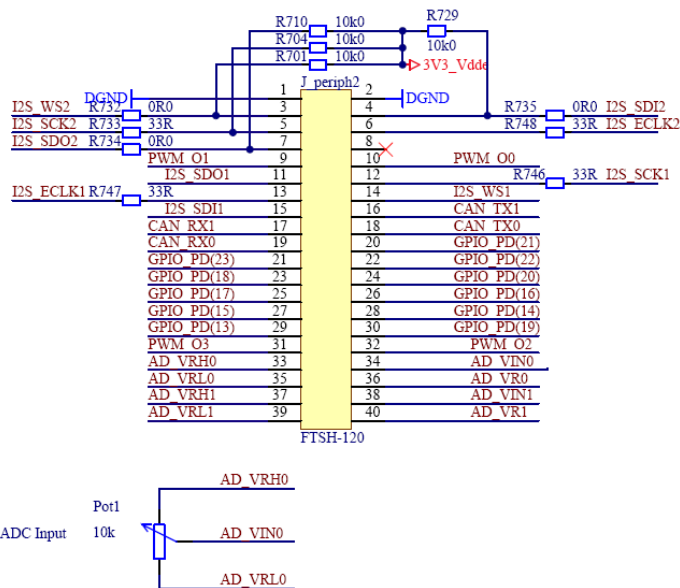
5.2 ADC test

Press '2' to enter the ADC test program.

This example reads in and prints out the current voltage applied to ADC 0.

NOTE: The voltage range is between 0 to 3.3V!
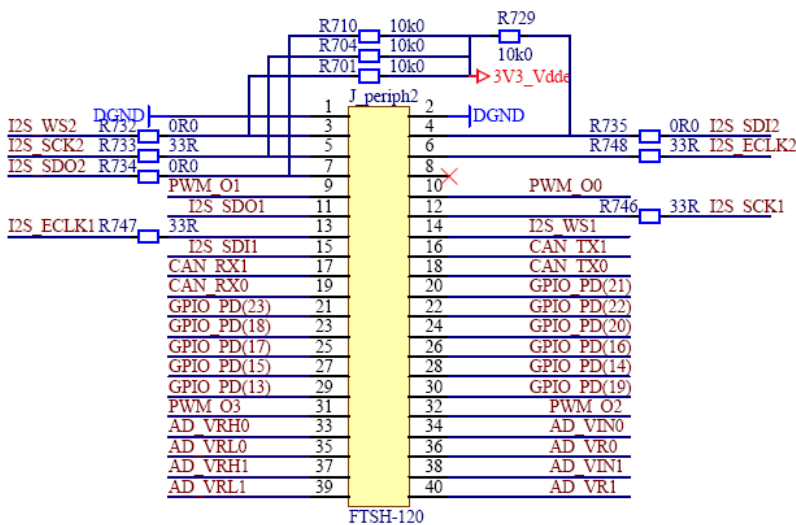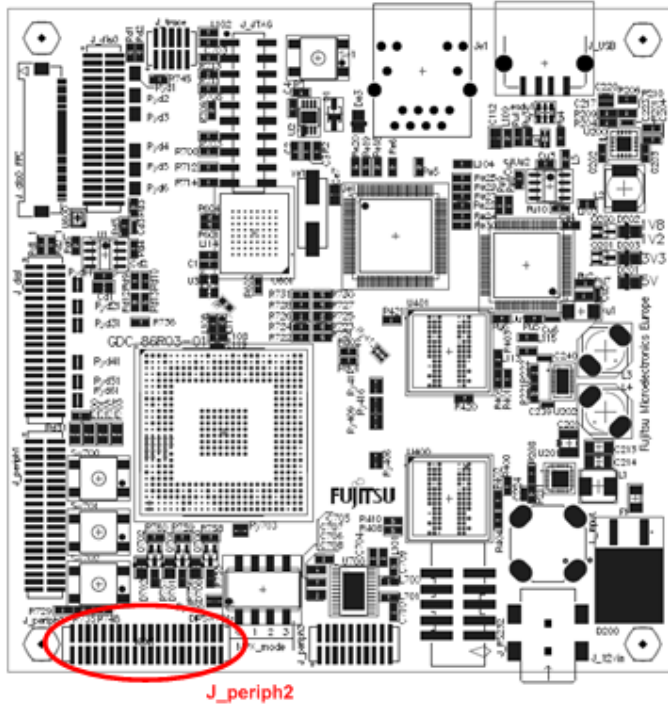

J_periph2

Example connection:

5.3 PWM test

Press '3' to enter the PWM test program.

This example enables PWM 0 and PWM 1. Grab the signals on the pin header J_periph2.

PWM0: J_periph2 Pin 10
PWM1: J_periph2 Pin 9

J_periph2

FTSH-120

NOTE: The display backlight can be controlled with PWM1. If you therefore enter this test the display brightness will be decreased.

5.4 Button test

Press '4' to enter the button test program.

This example shows how to control the on board buttons and LEDs. Press one of the three buttons and see how the LED status changes.
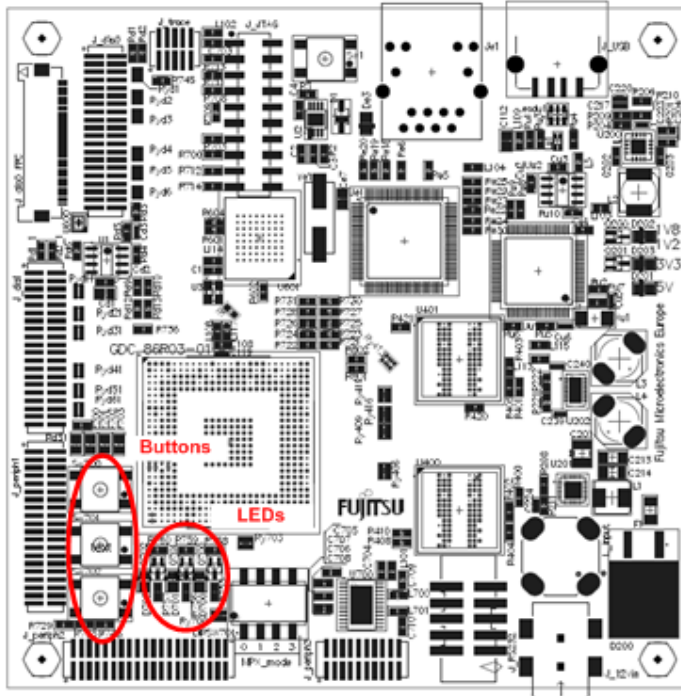
5.5 GDC1 test

Press '5' to enter the GDC1 test program for VGA displays.

This example shows a simple graphic on a VGA (640x480) display. See the board connection chapter for more details on the display connection.
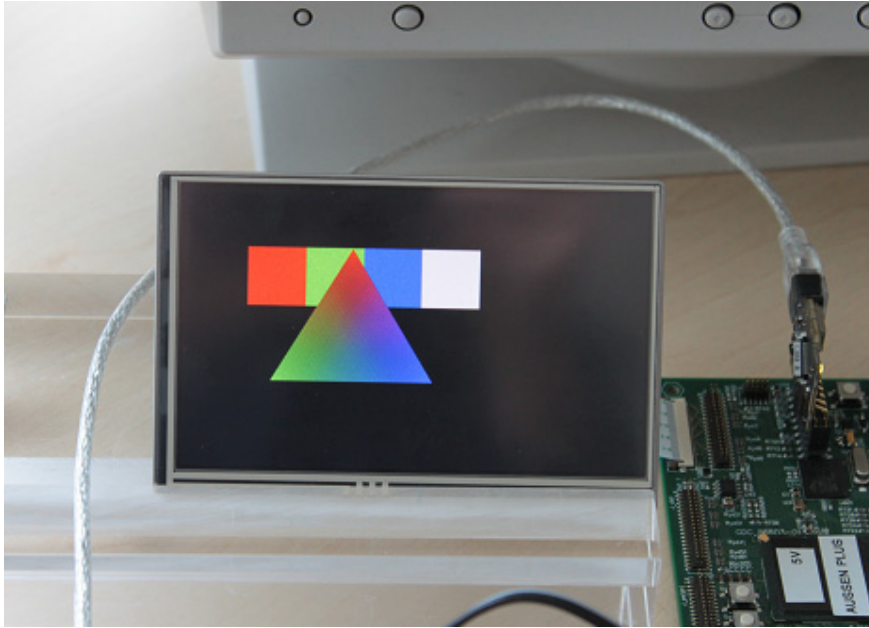
NOTE: The Jade-L starterkit is shipped with a WVGA (800x480) display. If you select this test the display turns white and nothing is showed. Please select GDC2 test instead.

5.6   GDC2 test

Press '6' to enter the GDC2 test program for WVGA displays.

This example shows a simple graphic on a WVGA (840x480) display. See the board connection chapter for more details on the display connection.

NOTE: The Jade-L starterkit is shipped with a WVGA (800x480) display.

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5.7 Touch panel test

Press '7' to enter the touch panel test program. See the board connection chapter for more details on the display connection.

This example shows a how to use the touch panel. The touch panel is connected to a touch panel controller (TSC2007) which is connected via I2C to the Jade device.

Press the touch panel and see the coordinates printed out on the serial console.

6 Control Panel demo shipped with the board

The board is already flashed with a basic control panel. It can be controlled by pressing the touch panel. See the following image for more details on the button assignment.
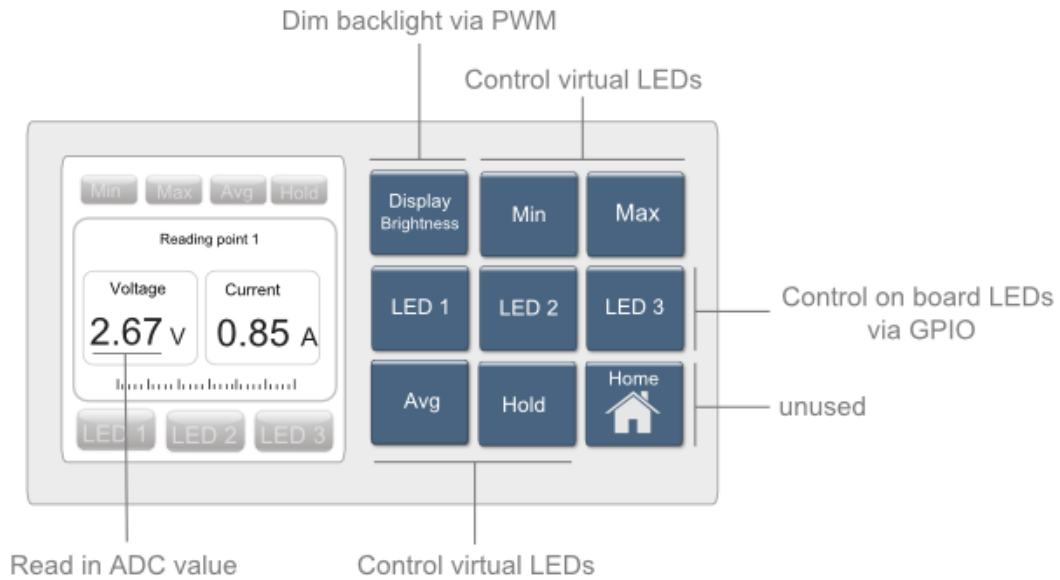
The example can be downloaded from our website

http://www.fujitsu.com/emea/services/microelectronics/gdc/gdcdevices/mb86r03-jade-l.html

7 GHC Control Panel tutorial

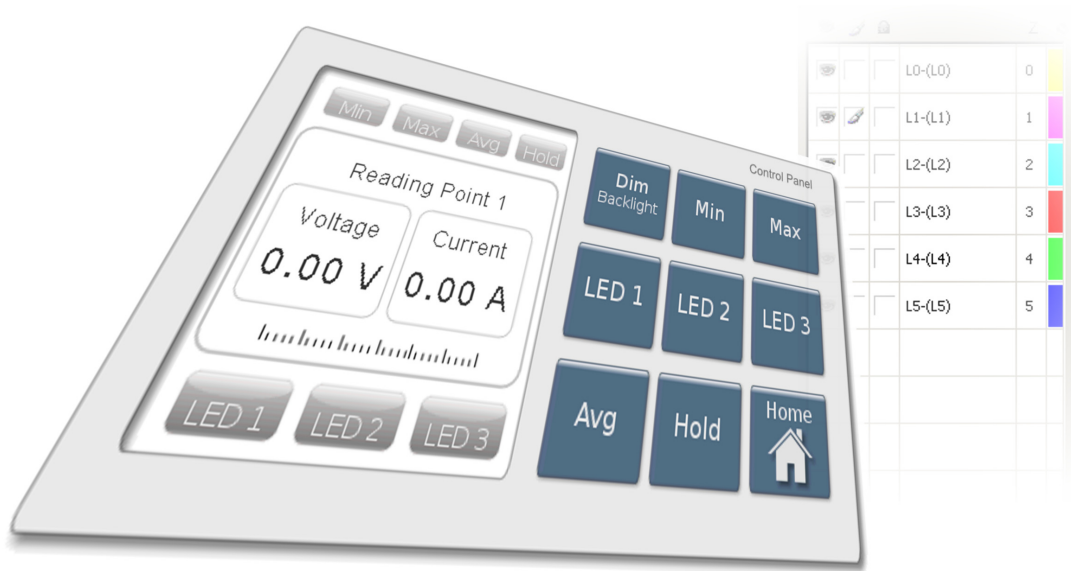If you are interested to see how easy it is to implement a basic control panel just download the tutorial from our website

http://www.fujitsu.com/emea/services/microelectronics/gdc/gdcdevices/mb86r03-jade-l.html

8 Appendix

8.1 Troubleshooting

Problem	Solution
Evaluation board does not power-on correctly. Some or all of the power LEDs (1V8,1V2,3V3,5V) do not light up.	Check voltage supply and jumpers : The voltage on DC-Power plug should be in the range of 9-12V. The plug should have - on shield and + on the center. The power supply should be able to supply 1500mA to support both, the evaluation board and the display. The LEDs should light up after switching on the board. Use a multimeter to see whether 5V,3.3V, 1.8V and 1.2V are present on the Vcc/Gnd terminals.

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