# uEZGUI Users Manual

***Covers the following products:***

## *uEZGUI-1788-70WVT*




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# 1. Introduction

The uEZGUI-1788-70WVT provides a quick and easy solution for implementing a Graphical User Interface (GUI) based design by providing the basic functions necessary for most customer products.

# 2. Block Diagram

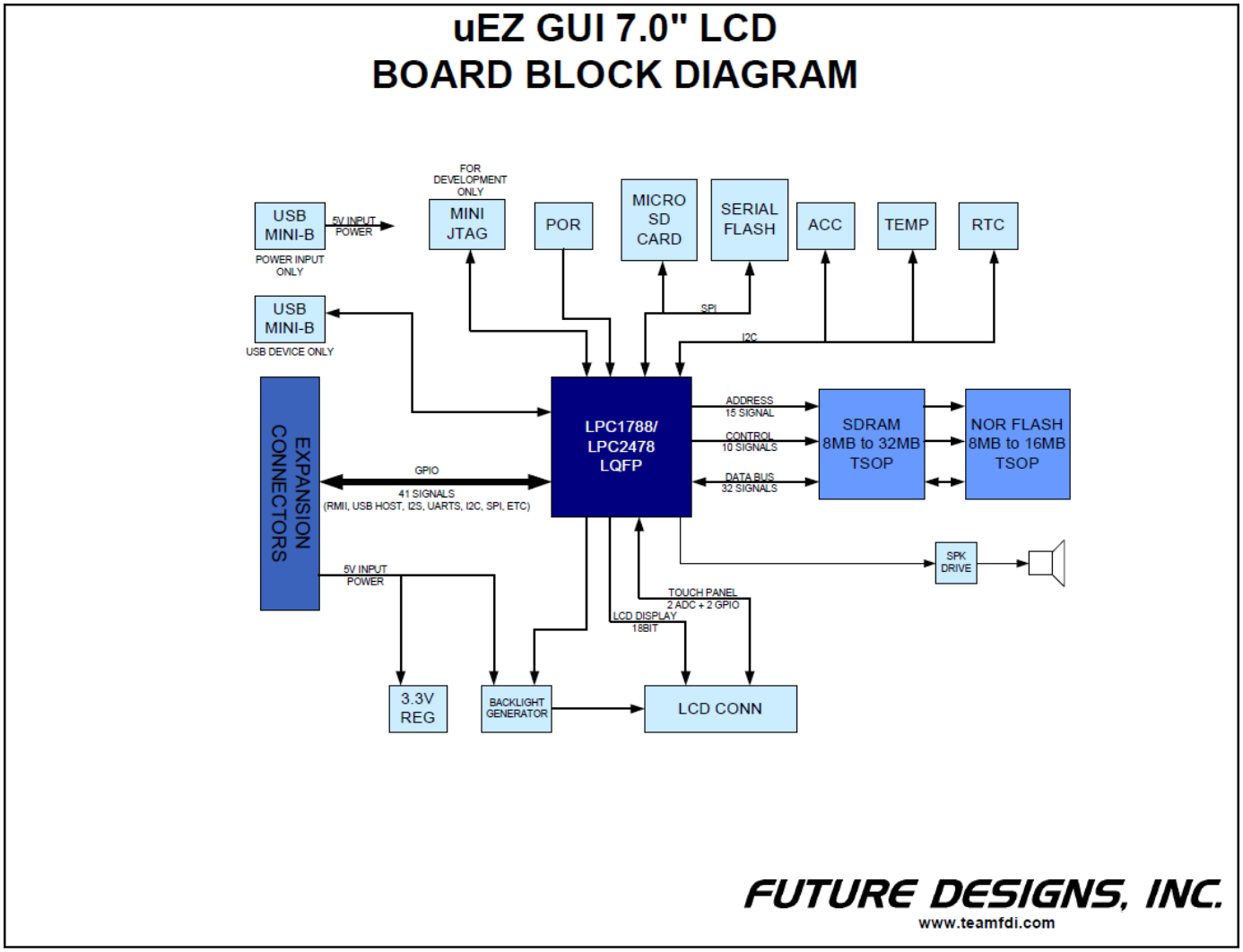


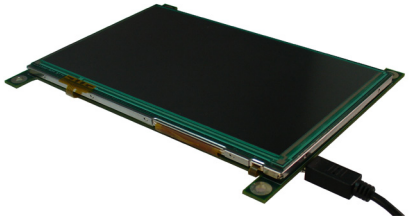

Figure 1 – uEZGUI-1788-70WVT Block Diagram

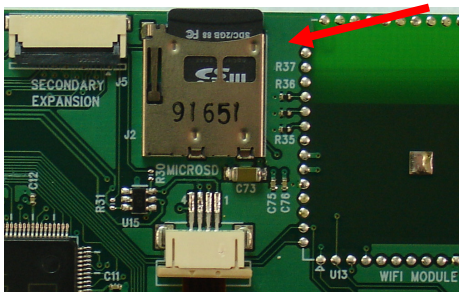
## 3. Functional Description

- LPC1788 Cortex-M3 based Microprocessor
- SDRAM 8MB, optional up to 16MB
- NOR FLASH 8MB, optional up to 16MB
- Serial EEPROM with Access Protection (optional)
- Internal 4kB EEPROM
- RTC – Real Time Clock
- Temperature Sensor
- 3-axis Accelerometer
- Optional 128Mbit Serial Flash
- Optional WiFi Module
- Speaker
- Micro SD Card Socket for up to 2GB storage (SDHC currently not supported)
- Mini JTAG
- ISP Connector for use with USP-ICP-LPC2K
- Power-on Reset Generator - power-on reset supervisor and voltage monitor (SW1)
- Expansion Connector for customer specific applications

## 4. Startup procedure

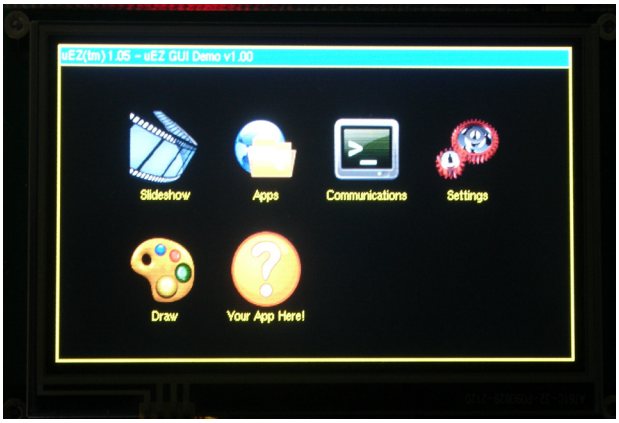
The uEZ GUI kit comes with a pre-installed 2 GB micro SD card that contains files required for the slide show to run. It also contains users' manuals, schematics, and documentation for the product.






Power is supplied via a USB cable and power supply provided in the kit. Connect the USB cable to the mini B USB connector labeled 5V 1A min input only.

The following screens should appear once power has been applied to the kit:


At this point the unit is ready for software demonstrations and user operation.

***The uEZGUI will appear as a USB Flash Drive to the PC, allowing the user to read/write files directly to the Micro SD card.***

## 5. Demonstration Software Main Menu

The Demonstration Software has the following options:

**Slideshow**

Selecting the slideshow icon will cause the Micro SD card to be read. This demonstration allows the user to select between several slideshow options such as "Introduction to uEZ GUI", "Demonstration Pictures", "FDI Overview", "Strategic Partners", etc. Select the play button to begin the automated slide show or manually by "dragging" a stylus or finger at least half way across the screen. After approximately 30 seconds of no activity the slideshow will begin to auto scroll. The user can regain manual control at any time by "dragging" forward or backwards to the next slide. Click on the "X "to return to the main menu.

***The following programs appear under the "Apps" icon:***

**Accelerometer**

Selecting this icon demonstrates the accelerometer feature by moving a simulated ball across the screen as the board is tilted along the X and Y axis. To return to the main menu touch the exit icon.

**Time and Date**

This feature displays the current time and date from the external Real Time Clock (RTC). Touch "Time" to advance to the "Set Time" screen or touch "Date" to advance to the "Set Date" screen and set or update the date as necessary. To change the time or date simply click on the section you want to change and increase or decrease using the up and down indicators. Once set an on-board super cap will back-up the time and date for several days (typically) if the unit is powered off. To return to the main menu touch the exit icon.

**Temperature**

Selecting this icon displays the temperature from the LM75 temperature sensor. To select between Celsius and Fahrenheit click the "C' or "F" to change. To return to the main menu touch the exit icon.

***Exit the "Apps" Icon to the main screen and the following programs are available***

**Communications**

This option is only valid on uEZGUI-1788-70WVT with attached uEZGUI-EXP1.

**Settings ICON**

C**alibrate** use this feature to calibrate the LCD for the first time or if corrections are required.

F**unctional Test** is a step by step test of the following parameters:

- Speaker test
- LCD color test
- SDRAM size test
- Temperature
- EEPROM test
- NOR Flash Memory test

**Draw**

A very simple art program is provided. Use the touch screen to draw lines in the box to the right. Clicking on **Color** allows the color to be changed between various options. Hint – use black to erase. **Save** stores the graphic

image as the file IMAGE.RAW on the Micro SD card. **Load** recalls the saved graphic image from the Micro SD card.

## 6. Setting up a Slideshow

The Slideshow demonstration loads and scrolls between images provided on a SD micro card. Images must be in 24 bit uncompressed Targa (.TGA) format. Adobe Photoshop and many other graphics programs can save images in this format. The images must be 800x480 and 11.11"x6.67" in size and use the file names WVSLIDExx.TGA where xx is 00 thru 99. (i.e. WVSLID01.tga, WVSLID02.tga, etc).

Images must be stored in a directory under /SLIDES. Edit the file "SLIDES.TXT" by adding a line in the following format: "*<title>,<directory>*". The field *<title>* is the text shown when selecting a slideshow. The field *<directory>* is the subdirectory in which the slides are found. The field *<directory>* must be 8 characters or less.

NOTE: Currently, the uEZ GUI will only allow selection of the top four entries of "SLIDES.TXT".

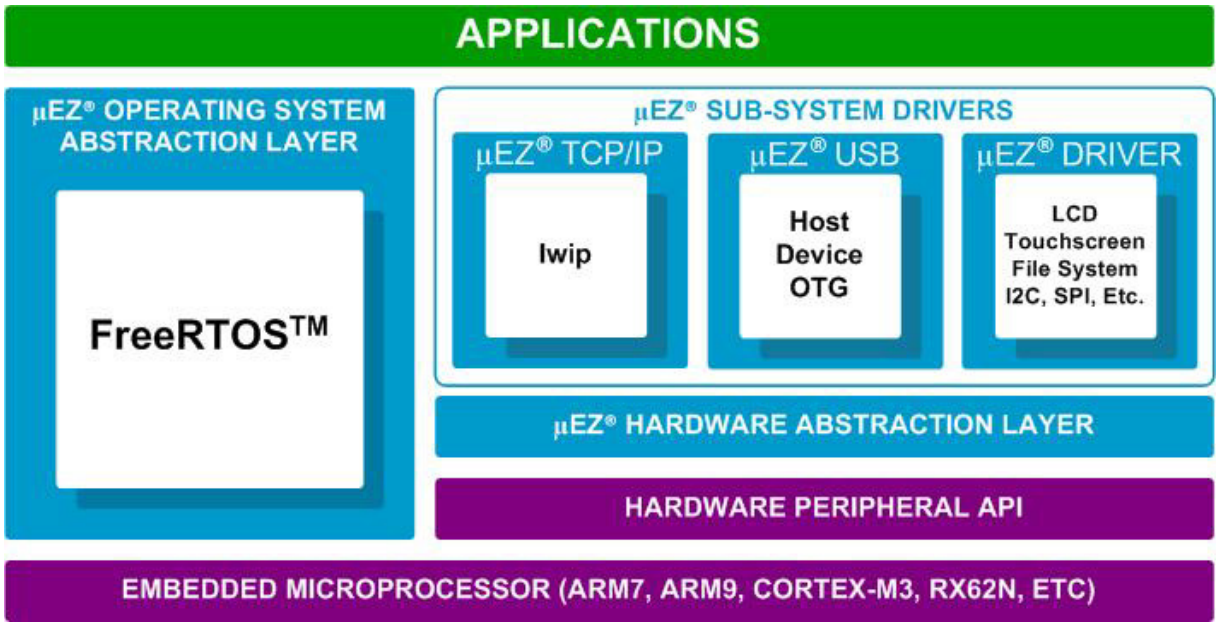
Place the pictures created above in the subdirectory listed in the "SLIDES.TXT" file. For example, entry "uEZGUI-1788-70WVT,UEZGUI" puts up a title of "uEZGUI-1788-70WVT" and loads the slides (WVSLID01.TGA to WVSLID08.TGA) from the directory /SLIDES/UEZGUI.

## 7. Software

**µEZ®** takes its name from the Muses of Greek mythology. A Muse was a goddess who inspired the creation process for the arts and sciences. Like its ancient Greek namesake, the **µEZ®** platform inspires rapid development by supplying customers with an extensive library of open source software, drivers, and processor support - all under a common framework. **µEZ®** development works on the premise of "design once, reuse many times". This provides an open source standard for embedded developers to build upon and support. **µEZ®** allows companies to focus on innovation and on their own value-added applications while minimizing development time and maximizing software reuse.

The diagram below shows a typical embedded application stack. **µEZ®** has three primary categories of components that help simplify embedded application development:

1. **Operating System Abstraction Layer (µEZ® OSAL)**
2. **Sub-system drivers (µEZ® TCP/IP, µEZ® USB, µEZ® Driver)**
3. **Hardware Abstraction Layer (µEZ® HAL)**




The selection of an RTOS can be one of the most daunting aspects of an embedded system development. With **µEZ®** the primary features of common multi-tasking operating systems are abstracted, thus easing the transition to an open source or low-cost RTOS. The **µEZ®** OSAL provides applications access to the following features in an OS-independent fashion:

- Pre-emptive multitasking
- Stack overflow detection
- Unlimited number of tasks
- Queues
- Semaphores (binary, counting, mutex)

The **µEZ®** sub-system drivers utilize the OSAL functions to provide protected access to the processor peripherals. The sub-system driver API functions are typically protocol layer interfaces (TCP/IP, USB, etc) designed as high-level access routines such as open, close, read, write, etc. where possible.

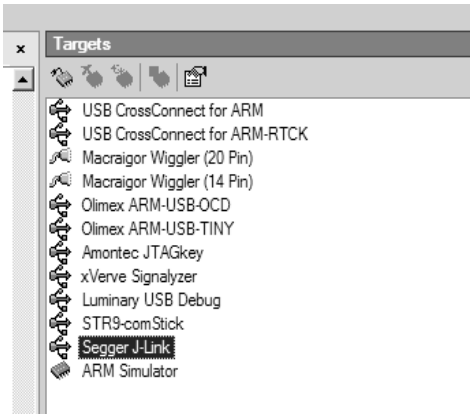
**µEZ®** is ideally suited for Embedded Systems with standard features such as:

- Processor and Platform BSPs (Board Support Packages)
- Real Time Operating System (RTOS)
- Memory Management
- NAND/NOR Flash
- SDRAM and DDR Memory
- TCP/IP stack
- USB Device/Host Libraries
- Mass Storage Devices
- LCD Displays with Touch Screen
- Input / Output Devices

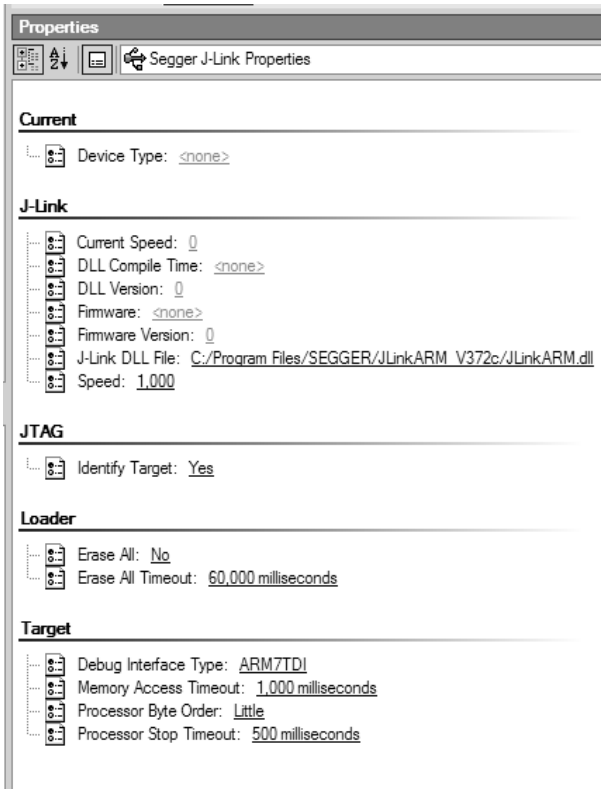
## 8. Configuring Rowley CrossWorks CrossStudio for ARM® for J-Link Flashing

1) See the document "uEZ® Software Quickstart Guide" for details on how to download the uEZ® source code and setup the Rowley CrossWorks compiler. (http://www.teamfdi.com/uez/files/MA00015%20uEZ%20Software%20Quickstart%20Guide.pdf)

2) Plug in the J-Link device into the PC and install any drivers as directed. The Segger J-Link drivers can be found at http://www.segger.com/cms/jlink-software.html with additional information at http://www.segger.com/cms/development-tools.html.
3) Plug in the J-Link's JTAG connector to the uEZGUI board at J3 with the JTAG adapter.
4) Select **Target** menu and choose **Targets**. The following list will appear to the right.



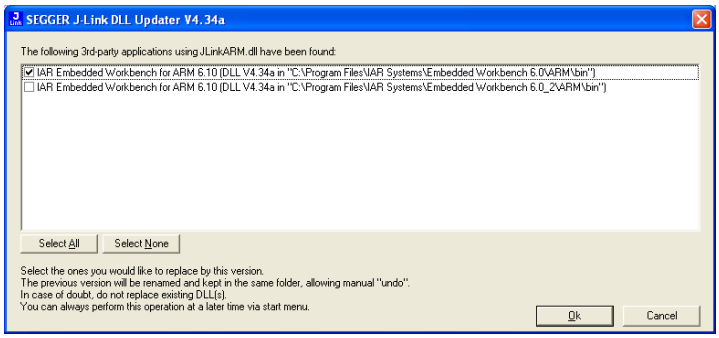

5) Right click on "Segger J-Link" and select Properties




6) If programming a blank LPC1788 part, select a Speed of 100. If the part has already been programmed, select a Speed of 1000.
7) Go back to menu **Target** and select "Connect Segger J-Link"
8) Compile the application and press F5 to download and start debugging.

## 9. Configuring IAR EWARM v6.10 for J-Link Flashing

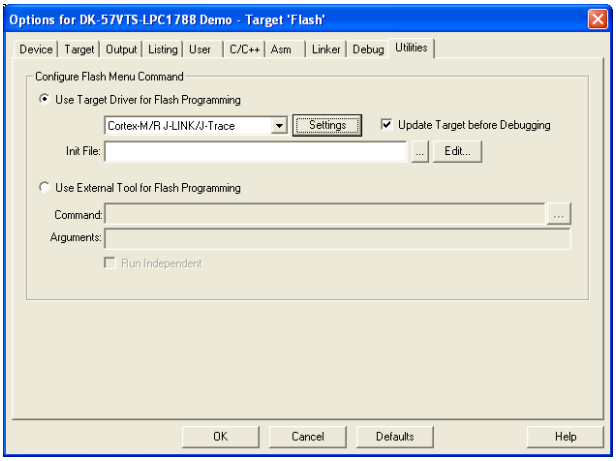
The IAR tools do not require any special configuration for configuring the J-Link tools. To update IAR's J-Link dll you just need to run Segger's J-Link DLL Updated and select the IAR install you wish to update and click Ok.



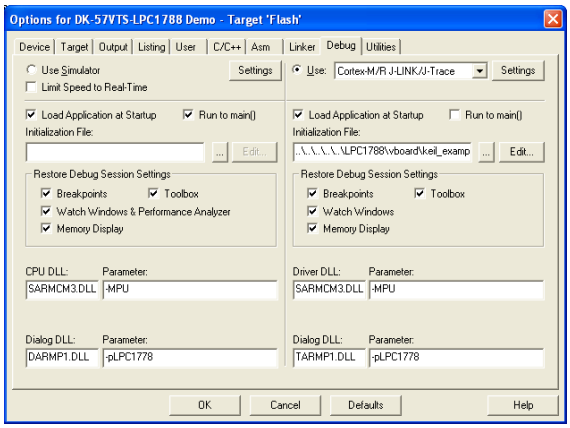

## 10. Configure Keil uVison 4 for J-Link Flashing

To configure Keil to use the following steps.

1. Click Flash from the Menu Bar and select Configure Flash Tools…
2. Click the Utilities Tab.
3. In the dropdown box for Use Target Driver for Flash Programming select the CORTEX-M/R J-LINK/J-Trace.




4. Click the Debug tab and select the same device for Use.

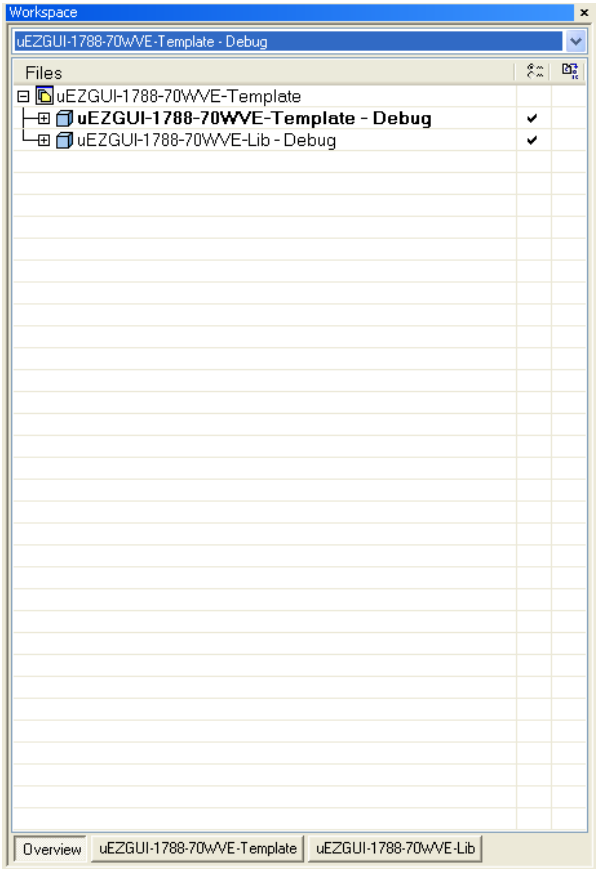



## 11. Template Project

Beginning in uEZ v1.12 projects will start using Platform Libraries for select platforms. Below is an example of the directory structure of the uEZGUI-1788-70WVE IAR 6.10 project. The uEZGUI-1788-70WVT and uEZGUI-1788-70WVE have similar project structures and the instructions for IAR are the same.

- FDIDemo – This is the project that the standard FDI demo uses.
- PlatformLib – This is the project that build the platform for the uEZGUI-1788-70WVE.
- Template – This project contains a limited demo and can be used as a starting point for new applications.

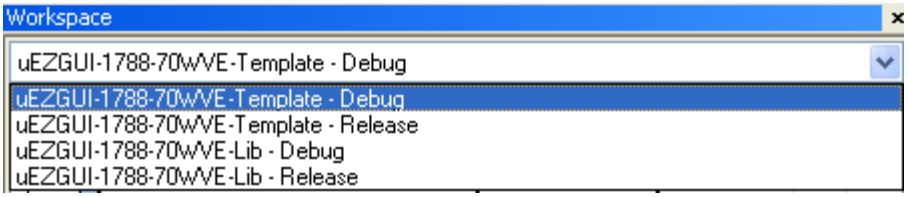
The template demo is a limited demo that passes control over to the Button Demo, this call can be replaced by your application. In the Button Demo four buttons are put on the screen and when pressed display a message on the screen. The IAR project is setup to be a multiple workspace solution to allow building the Platform and the application.




There are three tabs in the workspace window described below.

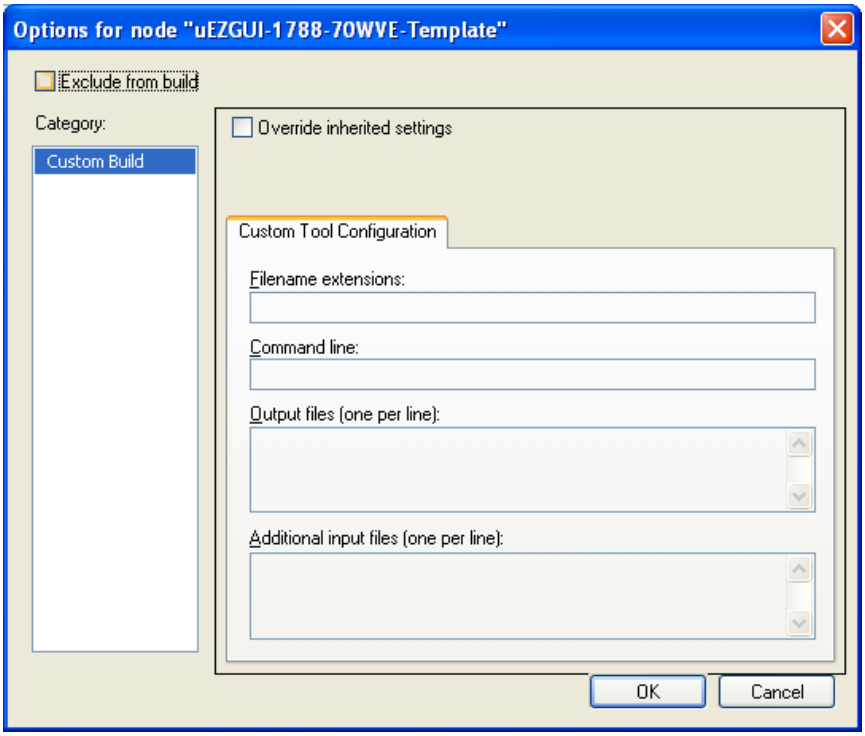
- Overview – High level view of the projects included.
- uEZGUI-1788-70WVE-Template – Project using the library to run the simple demo.
- uEZGUI-1788-70WVE-Lib – Project to build the Platform Library.

The first thing we will need to do is build the library. We have two options: Debug and Release. For now, we will start with Debug. Select “uEZGUI-1788-70WVE-Lib – Debug” in the workspace dropdown list.



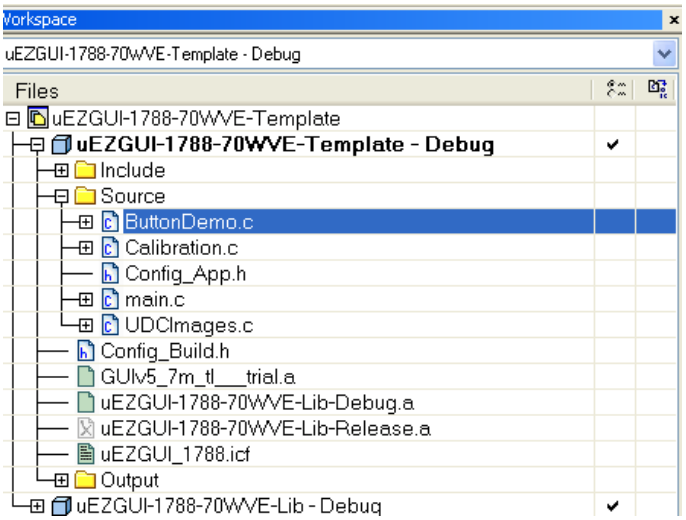
Press F7 to build the project.  After compiling is finished switch back to “uEZGUI-1788-70WVT-Template –Debug”.

The default configuration is to link the debug library, but it can be switched by right clicking on the library and selecting options, then toggle the Exclude from project checkbox.




Press F7 to build the template project. After compiling has finished press the  download and debug button to start the demo. After the download has finished, pressed F5 to run the new program.

The demo code is located in the directory “Source\App\uEZ GUI\uEZGUI-1788-70WVE-Template” and can also be viewed by opening Source under the Template project.



## 12. Functional Test Software

The Functional Test Software tests all the basic features of the uEZGUI-1788-70WVT Kit as follows.

Functional Test a step by step test of the following parameters:

- Accelerometer – Tests the presence of the accelerometer.
- EEPROM test - The EEPROM is tested for communication and integrity.
- LCD color test - Red, Green, and Blue are displayed in smooth bands to ensure the LCD lines are correct
- MicroSD – Looks for a Micro SD Card with the file “SLIDES/SLIDES.TXT”
- NOR Flash Memory test - basic test is performed to confirm read/write access.
- RTC – Sets the time and confirms the clock is running.
- SDRAM size test - Memory is sized and a basic test is performed to confirm read/write access.
- Speaker test - Tones are played and the User is asked to verify that they are heard.
- Temperature – the board has an external LM75A that is tested to be in a range of 20-30 C.

A final report of PASS or FAIL is displayed along with a list of any Skipped and Failed items.

## 13. Board Layout

The following figures illustrate the layout of the various components of the uEZGUI-1788-70WVT kit. They are for reference only and are subject to change.

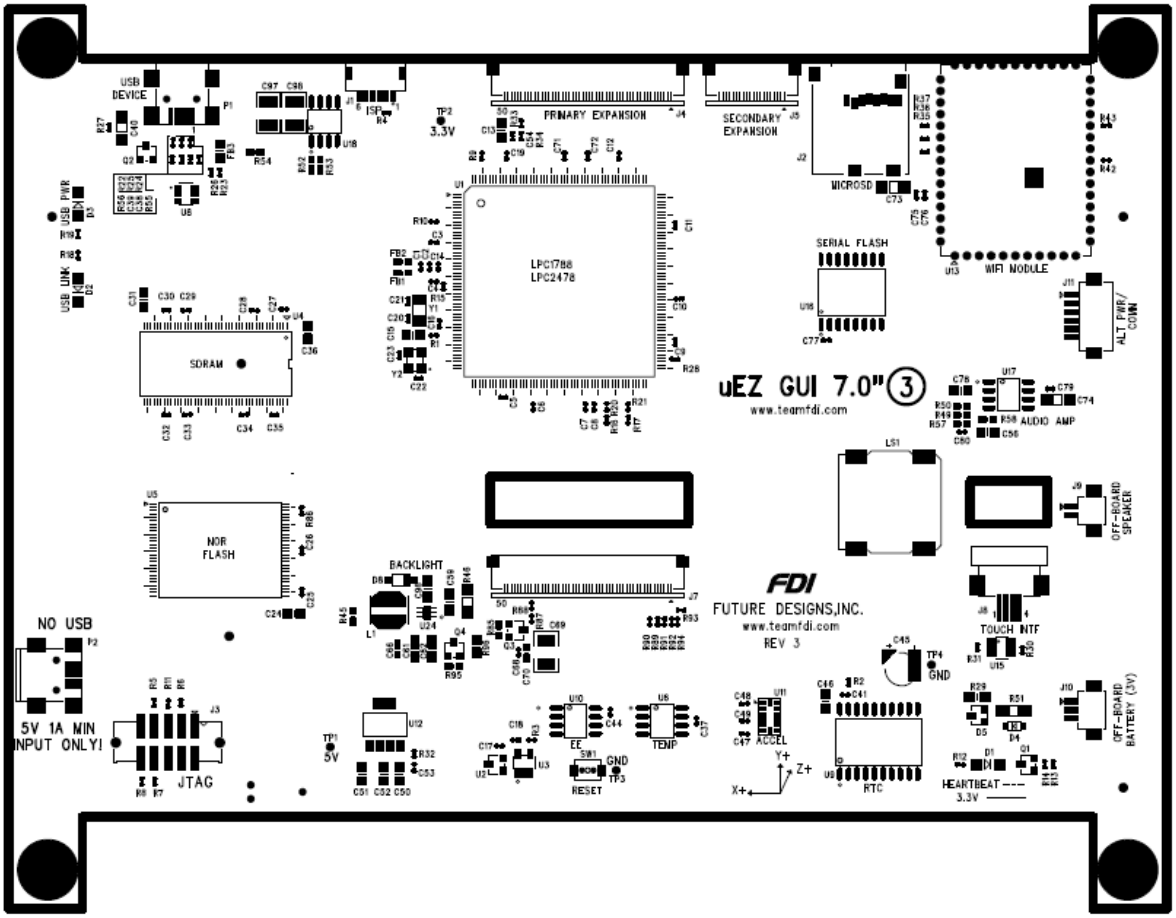



Figure 2 – uEZGUI-1788-70WVT Component View

# 14. I/O Connector Descriptions

## JTAG Connector

The uEZGUI-1788-70WVT uses a reduced size JTAG connector based on a 2mm Header. This smaller connector provides 100% of the functionality of the standard 20-pin JTAG connector, but utilizes 70% less board space. The connector is a standard part available from most major vendors.

| Pin Number | Description |
|---|---|
| 1 | GND |
| 2 | 5.0V |
| 3 | TDO |
| 4 | RESETn |
| 5 | TCK |
| 6 | RTCK |
| 7 | TDI |
| 8 | TMS |
| 9 | 3.3V |
| 10 | TRSTn |

For users that may have existing JTAG debuggers, an adapter may be fabricated using the following wiring diagram: (part numbers for the connectors are included from both the manufacturer and Digi-Key)

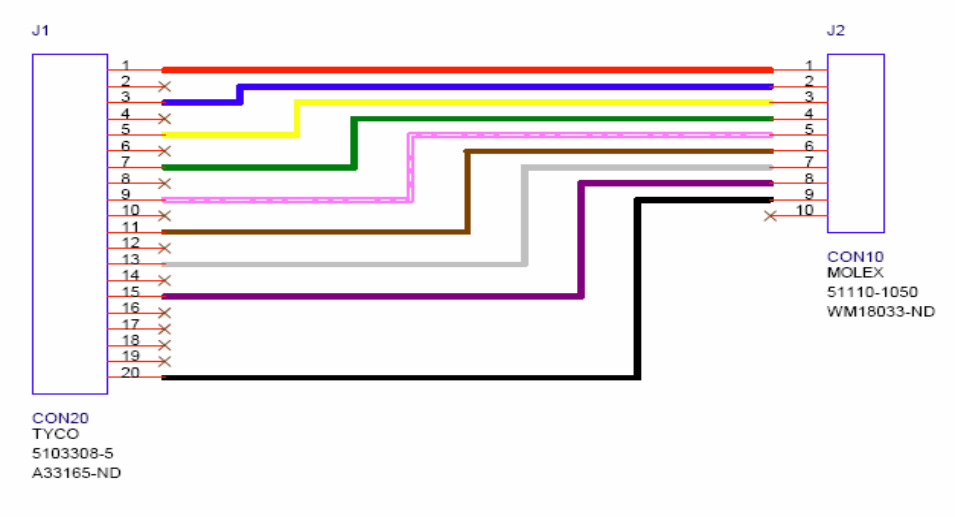



Figure 4 – Mini JTAG Adapter Wiring Diagram

## Tag Connect

The uEZGUI-1788-70WVT also includes the ability to JTAG and program using the Tag-Connect TC2050-ARM2010 ARM 20-pin to TC2050 Adapter.

Adapter:
http://www.tag-connect.com/tag-connect-2050-IDC-TG2050IDCNL

Cable:
http://www.tag-connect.com/TC2050-ARM2010

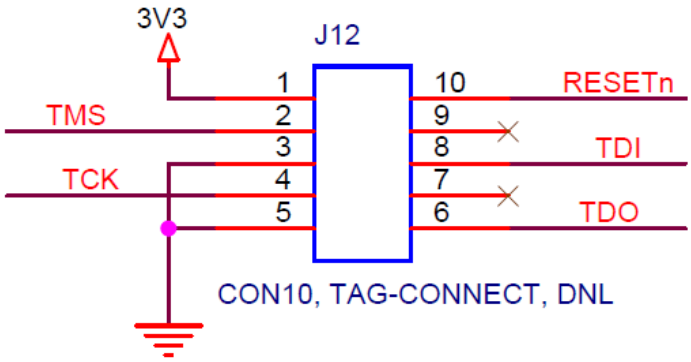



Figure 5 – Tag-Connect JTAG

## MicroSD Connector

When connected to the USB Host port on a PC, the uEZGUI-1788-70WVT will appear as a USB Flash Drive to the PC, allowing the user to read and write files directly to the MicroSD card. The unit uses a MicroSD Socket for flexible mass storage capability. At this time, the uEZ® software does not support SDHC MicroSD Cards.

| Pin Number | Description |
|---|---|
| 1 | NC |
| 2 | Micro SD Chip Select |
| 3 | Micro SD MOSI |
| 4 | 3.3V |
| 5 | Micro SD SCLK |
| 6 | Ground |
| 7 | Micro SD MISO |
| 8 | NC |

## ISP Connector (not loaded)

The uEZGUI-1788-70WVT is laid out with an ISP programming header that is designed to be utilized with the USB-ICP-LPC2K programmer from FDI. This connector is a 1.5mm JST Male, shrouded connector. The JST Part Number is: SM06B-SHLS-TF. The pin out shown below is a direct, 1:1 connection to the USB-ICP-LPC2K programmer available from Future Designs, Digi-Key or Mouser.

| Pin Number | Description |
|---|---|
| 1 | 3.3V |
| 2 | Reset Input |
| 3 | ISP Entry |
| 4 | Ground |
| 5 | RXD |
| 6 | TXD |

## Expansion Connectors

The uEZGUI-1788-70WVT includes two expansion connectors that provide a wide variety of capabilities for user expansion, ranging from 10/100 Ethernet to USB Host, etc.
The tables below provide the pinout and signal names available on these connectors:

**J4 Signal Details**

| Pin # | Pin Name | Pin Description | Input/output |
|---|---|---|---|
| 1 | Ground (GND) | | Power |
| 2 | P0.11_RXD2_SCL2_MAT3.1 | P0[11] - General purpose digital Input/Output pin. | Input/output |
| | | RXD2 - Receiver input for UART2. | Input |
| | | SCL2 - I2C2 clock Input/Output (this is not an open-drain pin) | Input/output |
| | | MAT3[1] -Match output for Timer3, channel 1. | Output |
| 3 | P0.10_TXD2_SDA2_MAT3.0 | P0[10] - General purpose digital Input/Output pin. | Input/Output |
| | | SDA2 - I2C2 data Input/Output (this is not an open-drain pin). | Input/Output |
| | | MAT3[0] - Match output for Timer3, channel 0. | Output |
| | | TXD2 -Transmitter output for UART2. | Output |
| 4 | P0.20_DTR1_MCICMD | P0[20] - General purpose digital Input/Output pin. | Input/Output |
| | | DTR1 - Data Terminal Ready output for UART1 | Output |
| | | SCL1 - I2C1 clock Input/Output (this is not an open-drain pin). | Input/Output |
| | | P0[19] - General purpose digital Input/Output pin. | Input/Output |
| | | SDA1-I2C1 data Input/Output (this is not an open-drain pin). | Input/Output |

| | | | |
|---|---|---|---|
| 5 | P0.19_DSR1_MCICLK | DSR1 - Data Set Ready input for UART1. | Input |
| 6 | P0.22_MCIDAT0_RTS1 | P0[22] - General purpose digital Input/Output pin. | Input/Output |
| | | RTS1 - Request to Send output for UART1. | Output |
| 7 | P0.17_CTS1 | P0 [17] - General purpose digital Input/Output pin | Input/Output |
| | | CTS1 - Clear to Send input for UART1. | Input |
| | | MISO - Master In Slave Out for SPI. | Input/Output |
| | | MISO0 - Master In Slave Out for SSP0. | Input/Output |
| 8 | P0.16_RXD1 | P0[16] - General purpose digital Input/Output pin. | Input/Output |
| | | SSEL0 - Slave Select for SP0. | Input/Output |
| | | RXD1 - Receiver input for UART1. | Input |
| 9 | P0.15_TXD1 | P0[15] - General purpose digital Input/Output pin. | Input/Output |
| | | SCK0 - Serial clock for SSP0. | Input/Output |
| | | TXD1 – Transmitter output for UART1. | Output |
| | | SCK - Serial clock for SPI. | Input/Output |
| 10 | Ground (GND) | | Power |
| 11 | USB1_DM | P0[30] - General purpose digital Input/Output pin. | Input/Output |
| | | USB_D- 1 - USB port 1 bidirectional D- line. | Input/Output |
| 12 | USB1_DP | P4[29] - General purpose digital Input/Output pin. | Input/Output |
| | | USB_D+1 - USB port 1 bidirectional D+ line. | Input/Output |
| 13 | USB1H_PWRD | P4[26] -General purpose digital Input/Output pin. | Input/Output |
| | | BLS0 - LOW active Byte Lane select signal 0. | Output |
| 14 | USB1H_OVC | P4[24] - General purpose digital Input/Output pin. | Input/Output |
| 15 | USB1H_PPWR | P0[19] - General purpose digital Input/Output pin. | Input/Output |
| | | CAP1[1] - Capture input for Timer 1, channel 1 | Input |
| | | USB_PPWR1 - Port Power enable signal for USB port 1. | Output |
| 16 | P0.9_I2STX_SDA_MOSI1_MAT2.3 | P0[9] -General purpose digital Input/Output pin. | Input/Output |
| | | I2STX_SDA - I2S transmit data. It is driven by the transmitter and read by the receiver. Corresponds to the signal SD in the I2S-bus specification. | Input/Output |
| | | MAT2[3] - Match output for Timer 2, channel 3 | Output |
| | | MOSI1 - Master Out Slave In for SSP1. | Input/Output |
| 17 | P0.8_I2STX_WS_MISO1_MAT 2.2 | P0[8] -General purpose digital Input/Output pin. | Input/Output |
| | | I2STX_WS - I2S Transmit word select. It is driven by the master and received by the slave. Corresponds to the signal WS in the I2S-bus specification. | Input/Output |
| | | MAT2[2] - Match output for Timer 2, channel 2 | Output |
| | | MISO1 - Master In Slave Out for SSP1. | Input/Output |
| 18 | P0.7_I2STX_CLK_SCK1_MAT 2.1 | P0[7] – General purpose digital Input/Output pin. | Input/Output |
| | | I2STX_CLK - I2S transmit clock. It is driven by the master and received by the slave. Corresponds to the signal SCK in the I2S-bus specification. | Input/Output |
| | | MAT2[1] - Match output for Timer 2, channel 1 | Output |
| | | SCK1 - Serial Clock for SSP1. | Input/Output |
| 19 | P0.6_I2SRX_SDA_SSEL1_MAT2.0 | P0[6] - General purpose digital Input/Output pin | Input/Output |
| | | I2SRX_SDA - I2S Receive data. It is driven by the transmitter and read by the receiver. Corresponds to the signal SD in the I2S-bus specification. | Input/Output |
| | | SSEL1 - Slave Select for SSP1. | Input/Output |
| | | MAT2[0] - Match output for Timer 2, channel 0 | Output |
| | | P0[5] - General purpose digital Input/Output pin. | Input/Output |
| | | I2SRX_WS - I2S Receive word select. It is driven by the master and | Input/Output |

| | | | |
|---|---|---|---|
| 20 | P0.5_I2SRX_WS_TD2_CAP2.1 | received by the slave. Corresponds to the signal WS in the I2S-bus specification. | |
| | | TD2 - CAN2 transmitter output. | Output |
| | | CAP2[1] - Capture input for Timer 2, channel 1 | Input |
| 21 | P0.4_I2SRX_CLK_RD2_CAP2.0 | P0[4] -General purpose digital Input/Output pin. | Input/Output |
| | | I2SRX_CLK - I2S Receive clock. It is driven by the master and received by the slave. Corresponds to the signal SCK in the I2S-bus specification. | Input/Output |
| | | RD2 - CAN2 receiver input | Input |
| | | CAP2[0] - Capture input for Timer 2, channel 0 | Input |
| 22 | Ground (GND) | | Power |
| 23 | RESET_INn | External reset input: A LOW on this pin resets the device, causing I/O ports and peripherals to take on their default states, and processor execution to begin at address 0. TTL with hysteresis, 5 V tolerant | Input |
| 24 | RESET_OUTn | RSTOUT - This is a 3.3 V pin. LOW on this pin indicates LPC1788 being in Reset state | Output |
| 25 | P0.26_AD03_AOUT_RXD3 | P0[26] General purpose digital Input/Output pin. | Input |
| | | AD0[3] - A/D converter 0, input 3. | Output |
| | | AOUT - D/A converter output. | Input |
| | | RXD3 - Receiver input for UART3 | Input/Output |
| 26 | P1.31_SCK1_AD0.5 | P1[31] – General purpose digital Input/Output pin. | Input/Output |
| | | SCK1 - Serial Clock for SSP1. | Input/Output |
| | | AD0[5] - A/D converter 0, input 5 | Input |
| 27 | P1.17_ENET_MDIO | P1[17] - General purpose digital Input/Output pin. | Input/Output |
| | | ENET_MDIO - Ethernet MIIM data input and Output | Input/Output |
| 28 | P1.16_ENET_MDC | P1[16] - General purpose digital Input/Output pin. | Input/Output |
| | | ENET_MDC - Ethernet MIIM clock | Output |
| 29 | Ground (GND) | | Power |
| 30 | P1.15_ENET_REFCLK | P1[15] – General purpose digital Input/Output pin. | Input/Output |
| | | ENET_REF_CLK/ENET_RX_CLK – Ethernet Reference Clock (RMII interface)/ Ethernet Receive Clock (MII interface) | Input |
| 31 | P1.14_ENET_RX_ER | P1[14] –General purpose digital Input/Output pin. | Input/Output |
| | | ENET_RX_ER - Ethernet receive error (RMII/MII interface) | Input |
| 32 | 3p3 volts | 3.3 volts | Power |
| 33 | P1.10_ENET_RXD1 | P1[10] – General purpose digital Input/Output pin. | Input/Output |
| | | ENET_RXD1 - Ethernet receive data 1 (RMII/MII interface) | Input |
| 34 | P1.9_ENET_RXD0 | P1[9] - General purpose digital Input/Output pin. | Input/Output |
| | | ENET_RXD0 - Ethernet receive data 0 (RMII/MII interface) | Input |
| 35 | P1.8_ENET_CRSDV | P1[8] - General purpose digital Input/Output pin. | Input/Output |
| | | ENET_CRS_DV/ENET_CRS – Ethernet Carrier Sense/Data Valid (RMII interface)/ Ethernet Carrier Sense (MII interface) | Input |
| 36 | P1.4_ENET_TXEN | P1[4] - General purpose digital Input/Output pin. | Input/Output |
| | | ENET_TX_EN - Ethernet transmit data enable (RMII/MII interface) | Output |
| 37 | P1.1_ENET_TXD1 | P1[1] - General purpose digital Input/Output pin. | Input/Output |
| | | ENET_TXD1 - Ethernet transmit data 1 (RMII/MII interface) | Output |
| 38 | P1.0_ENET_TXD0 | P1[0] - General purpose Digital Input/Output pin. | Input/Output |
| | | ENET_TXD0 - Ethernet transmit data 0 (RMII/MII interface) | Output |
| 39 | Ground (GND) | | Power |
| 40 | P2.10_EINT0_NMI | I/O - P2[10] - General purpose digital Input/Output pin.<br>Note: LOW on this pin while RESET is LOW forces on-chip boot loader to | Input/output |

| | | | |
|---|---|---|---|
| | | take over control of the part after a reset. | |
| 41 | P0.3_RXD0 | P0[3] - General purpose digital Input/Output pin. | Input/Output |
| | | RXD0 - Receiver input for UART0 | Input |
| 42 | P0.2_TXD0 | P0[2] - General purpose digital Input/Output pin. | Input/Output |
| | | TXD0 - Transmitter output for UART0 | Output |
| 43 | USBD_DP | P0[31] - General purpose digital Input/Output pin. | Input/Output |
| | | USB_D+2 - USB port 2 bidirectional D+ line | Input/Output |
| 44 | USBD_DM | USB_D□2 - USB port 2 bidirectional D □line | Input/Output |
| 45 | USBD_VBUS | P1[30] - General purpose digital Input/Output pin. | Input/Output |
| | | USB_PWRD2 - Power Status for USB port 2. | Input |
| | | VBUS - Monitors the presence of USB bus power. Note: This signal must be HIGH for USB reset to occur. I - AD0[4] - A/D converter 0, input 4 | Input |
| 46 | 5volts (5VO) | 5.0 Volts | Power |
| 47 | 5volts (5VO) | 5.0 Volts | Power |
| 48 | 5volts (5VO) | 5.0 Volts | Power |
| 49 | 3p3 volts (3V3) | 3.3 Volts | Power |
| 50 | 3p3 volts (3V3) | 3.3 Volts | Power |

**J5 Signal Details**

| Pin # | Pin Name | Pin Description | Input/output |
|---|---|---|---|
| 1 | Ground (GND) | | Power |
| 2 | P5.4_TXD0_OE_MAT3.3_TXD4 (LPC1788 only) | P5[4] – General Purpose digital Input/Output | Input/Output |
| | | TXD0_OE - UART0 Transmitter Output Enable | Output |
| | | MAT3[3] – Match output for Timer 3, channel 3 | Output |
| | | TXD4 – UART4 Transmit data | Output |
| 3 | P5.3_RXD4_SCL0+ (LPC1788 only) | P5[3] – General Purpose digital Input/Output | Input/Output |
| | | RXD4- UART4 receive data | Input |
| | | SCL0+ - I2C Clock for FM+ Operation | Input/Output |
| 4 | P5.2_MAT3.2_SDA0+ (LPC1788 only) | P5[3] – General Purpose digital Input/Output | Input/Output |
| | | MAT3[2] – Match output for Timer 3, channel 2 | Output |
| | | SDA0+ - I2C Data for FM+ Operation | Input/Output |
| 5 | P1.12_MCIDAT3_PCAP0.0 | P1[12] – General Purpose digital Input/Output | Input/Output |
| | | MCIDAT3 – Data line 3 for SD/MMC interface | Input/Output |
| | | PCAP0[0]- Capture input for PWM0 channel 0 | Input |
| 6 | P1.11_MCIDAT2_PWM0.6 | P1[11] – General Purpose digital Input/Output | Input/Output |
| | | MCIDAT2 – Data line 2 for SD/MMC interface | Input/Output |
| | | PWM0[6]-Pulse Width Modulator 0, output 6 | Output |
| 7 | P1.7_MCIDAT1_PWM0.5 | P1[7] – General Purpose digital Input/Output | Input/Output |
| | | MCIDAT1 – Data line 1 for SD/MMC interface | Input/Output |
| | | PWM0[5]-Pulse Width Modulator 0, output 5 | Output |
| 8 | P1.6_MCIDAT0_PWM0.4 | P1[6] – General Purpose digital Input/Output | Input/Output |
| | | MCIDAT1 – Data line 1 for SD/MMC interface | Input/Output |
| | | PWM0[4]-Pulse Width Modulator 0, output 4 | Output |
| 9 | P1.5_MCIPWR_PWM0.3 | P1[5] – General Purpose digital Input/Output | Input/Output |
| | | MCIPWR – Power Supply Enable for external SD/MMC Power Supply | Output |
| | | PWM0[3]-Pulse Width Modulator 0, output 3 | Output |
| 10 | P1.3_MCICMD-PWM0.2 | P1[3] – General Purpose digital Input/Output | Input/Output |

| | | | |
|---|---|---|---|
| | | MCICMD – Command line for SD/MMC interface | Input/Output |
| | | PWM0[2]-Pulse Width Modulator 0, output 2 | Output |
| 11 | P0.1_TD1_RXD3_RXD0 | P0[1] – General Purpose digital Input/Output | Input/Output |
| | | TD1 – Can1 transmitter output | Output |
| | | RXD3 – Receiver input for UART3 | Input |
| | | RXD0 – Alternate UART0 receive data | Input |
| 12 | P0.0_RD1_TXD3_TXD0 | P0[0] – General Purpose digital Input/Output | Input/Output |
| | | RD1 – Can1 receive input | Input |
| | | TXD3- Transmitter output for UART3 | Output |
| | | TXD0 – alternate UART0 transmit data | Output |
| 13 | 5volts(5VO) | 5.0 Volts | Power |
| 14 | Ground (GND) | | Power |
| 15 | P0.13_USB2_UPLED_AD0.7 | P0[13] – General Purpose digital Input/Output | Input/Output |
| | | UPLED- USB port 2 Good Link indicator | Output |
| | | AD0[7]- A/D converter0, input 7 | Input |
| 16 | P0.12_USBPPWR2_AD0.6 | P0[12] – General Purpose digital Input/Output | Input/Output |
| | | AD0[6]- A/D converter0, input 6 | Input |
| 17 | P0.25_AD0.2_TXD3 | P0[25] – General Purpose digital Input/Output | Input/Output |
| | | AD0[2]- A/D converter0, input 2 | Input |
| | | TXD3 – Transmitter output for UART3 | Output |
| 18 | TP_RL_Y2_P0.24_AD0.1 | TP_RL_Y2 – Touch panel interface right side horizontal [Not Typically Supported] | |
| | | P0[24] - General Purpose digital Input/Output | Input/Output |
| | | AD0[1] – A/D converter0, input 1 | Input |
| 19 | TP_RL_X1_P0.23_AD0.0 | TP_RL_X1 – Touch Panel left side horizontal [Not Typically Supported] | |
| | | P0[23] - General Purpose digital Input/Output | Input/Output |
| | | AD0[0] – A/D converter0, input 0 | Input |
| 20 | Ground (GND) | | Power |

### Expansion Connector Cable Details

The maximum length for the expansion connector cables is as follows:
General Purpose IO, TTL, Serial, etc = 6” recommended maximum, 8” absolute maximum
Ethernet, high-speed IO, etc = 3” recommended maximum, 4” absolute maximum

The following table provides example part numbers for the expansion cables:

| Description | Mfg | Mfg PN | Digi-Key Pn |
|---|---|---|---|
| 3” 20-pin 0.5mm | Molex | 21020-0209 | WM10226-ND |
| 6” 20-pin 0.5mm | Molex | 21020-0215 | WM10218-ND |
| 3” 50-pin 0.5mm | Molex | 21020-7650 | WM10231-ND |
| 6” 50-pin 0.5mm | Molex | 21020-0548 | WM10223-ND |

Note: These lengths are only recommendations. The actual lengths utilized will be dependent on the expansion board circuitry, layouts and general environment of the application. It is up to the customer to test and validate the functional operation and use of the expansion connectors.

## 15. ESD Warning

The uEZGUI-1788-70WVT kit is shipped in a protective anti-static package. The kit must not be subjected to high electrostatic potentials. Damage may occur to the boards that will not be covered under warranty. General practice for working with static sensitive devices should be followed when working with the kit.

# 16. Power Requirements

Power is supplied via a USB cable and power supply provided in the kit. The following typical power requirements were measured at room temperature with LPC1788 at 120MHz operating clock rate:

| Voltage | Booted at the uEZ Demo Screen | Observed Max |
|---|---|---|
| 5.0V | 604mA | 610mA |

# 17. Useful links

- Segger Mini-JTAG Debugger
  - http://www.segger.com/cms/jlink-software.html
- Rowley Crossworks IDE download for 30-day evaluation
  - http://www.rowley.co.uk/
- uEZ software quick start guide
  - http://www.teamfdi.com/uez/files/MA00015%20uEZ%20Software%20Quickstart%20Guide.pdf

# 18. Schematics

Please see FDI the website at http://www.teamfdi.com/ for support documentation.

# 19. Temperature Range

uEZGUI-1788-70WVT board w/o LCD: -40°C to +85°C

uEZGUI-1788-70WVT with LCD: -20°C to +70°C

# 20. Mechanical Details

The following illustrations show the mechanical details of the uEZGUI-1788-70WVT PCB

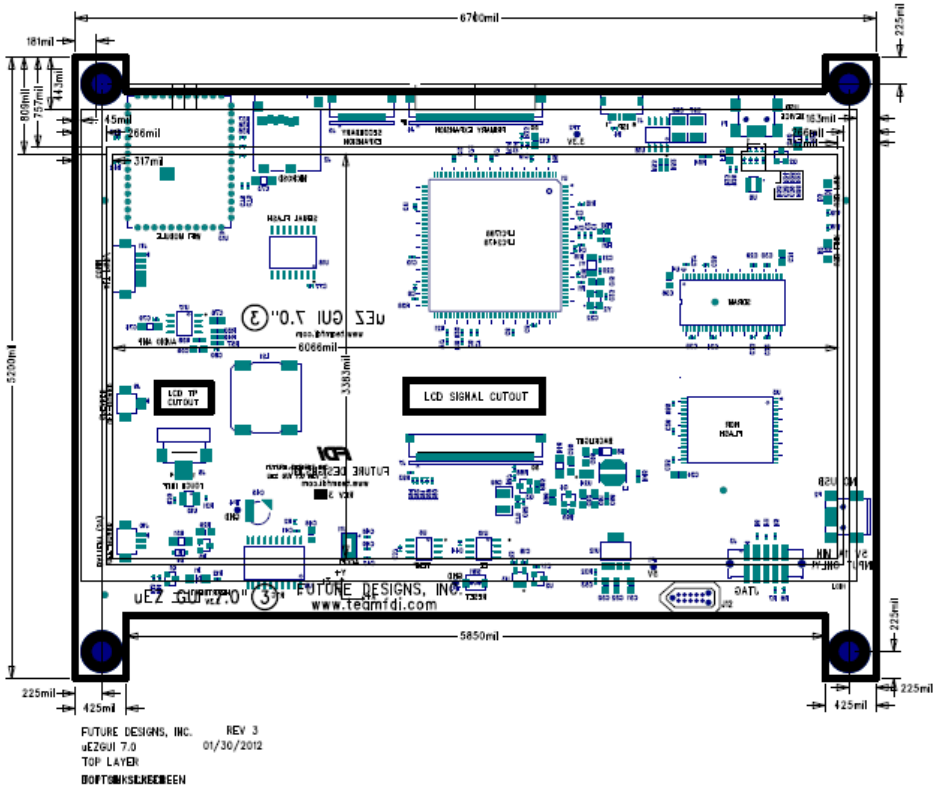
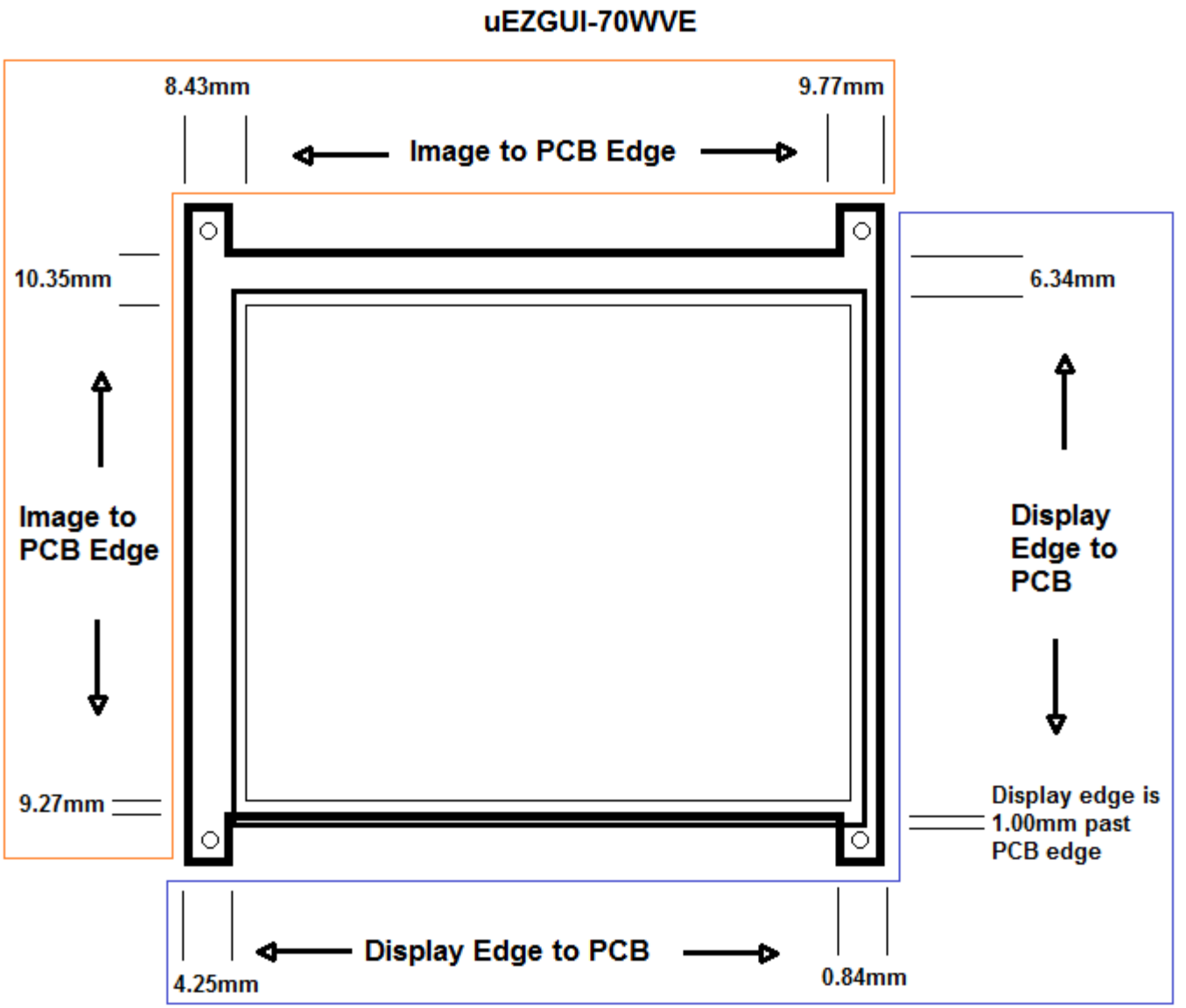
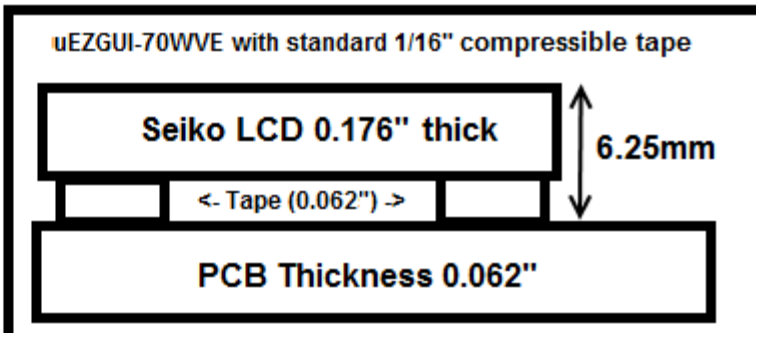



Figure 6 –Mechanical Layout (Component View)

## 21. Dimension comparison between 70WVE and 70WVT models



## uEZGUI-70WVT