

# uEZGUI-RX62N-35QT

## Users Manual

*Covers the following products:*  
*uEZGUI-RX62N-35QT*



Copyright ©2012, Future Designs, Inc., All Rights Reserved

**FDI** *Future Designs, Inc.*  
*Your Development Partner*  
2702 Triana Boulevard SW, Huntsville, AL 35805

## Table of Contents

1. Introduction	2
2. Block Diagram	2
3. Functional Description	3
4. Startup procedure	3
5. Demonstration Software Main Menu	4
6. Setting up a Slideshow	5
7. Software	5
8. Configuring Renesas HEW for J-Link Flashing	6
9. Functional Test Software	8
10. Board Layout	9
11. I/O Connector Descriptions	10
JTAG Connector (J1)	10
Tag-Connect (J7)	11
MicroSD Connector (J6)	12
Expansion Connector (J3)	13
Expansion Connector Cable Details	15
Alternate Power/Communications Connector (J2)	16
Alternate Power/Communications Connector Details	16
12. Mechanical Details	17
13. ESD Warning	19
14. Power Requirements	19
15. Useful links	19
16. Schematics	19
17. Operating Temperature Range	19

Information in this document is provided solely to enable the use of Future Designs products. FDI assumes no liability whatsoever, including infringement of any patent or copyright. FDI reserves the right to make changes to these specifications at any time, without notice. No part of this document may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without the express written permission of Future Designs, Inc. 2702 Triana Blvd, Huntsville, AL 35805.

For more information on FDI or our products please visit [www.teamfdi.com](http://www.teamfdi.com).

**NOTE:** The inclusion of vendor software products in this kit does not imply an endorsement of the product by Future Designs, Inc.

© 2012 Future Designs, Inc. All rights reserved.

uEZ® is a registered trademark of Future Designs, Inc.

Microsoft, MS-DOS, Windows, Windows XP, Microsoft Word are registered trademarks of Microsoft Corporation.

Other brand names are trademarks or registered trademarks of their respective owners.

FDI PN:

Revision:2, 3/1/2012

Printed in the United States of America

# 1. Introduction

The uEZGUI-RX62N-35QT 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

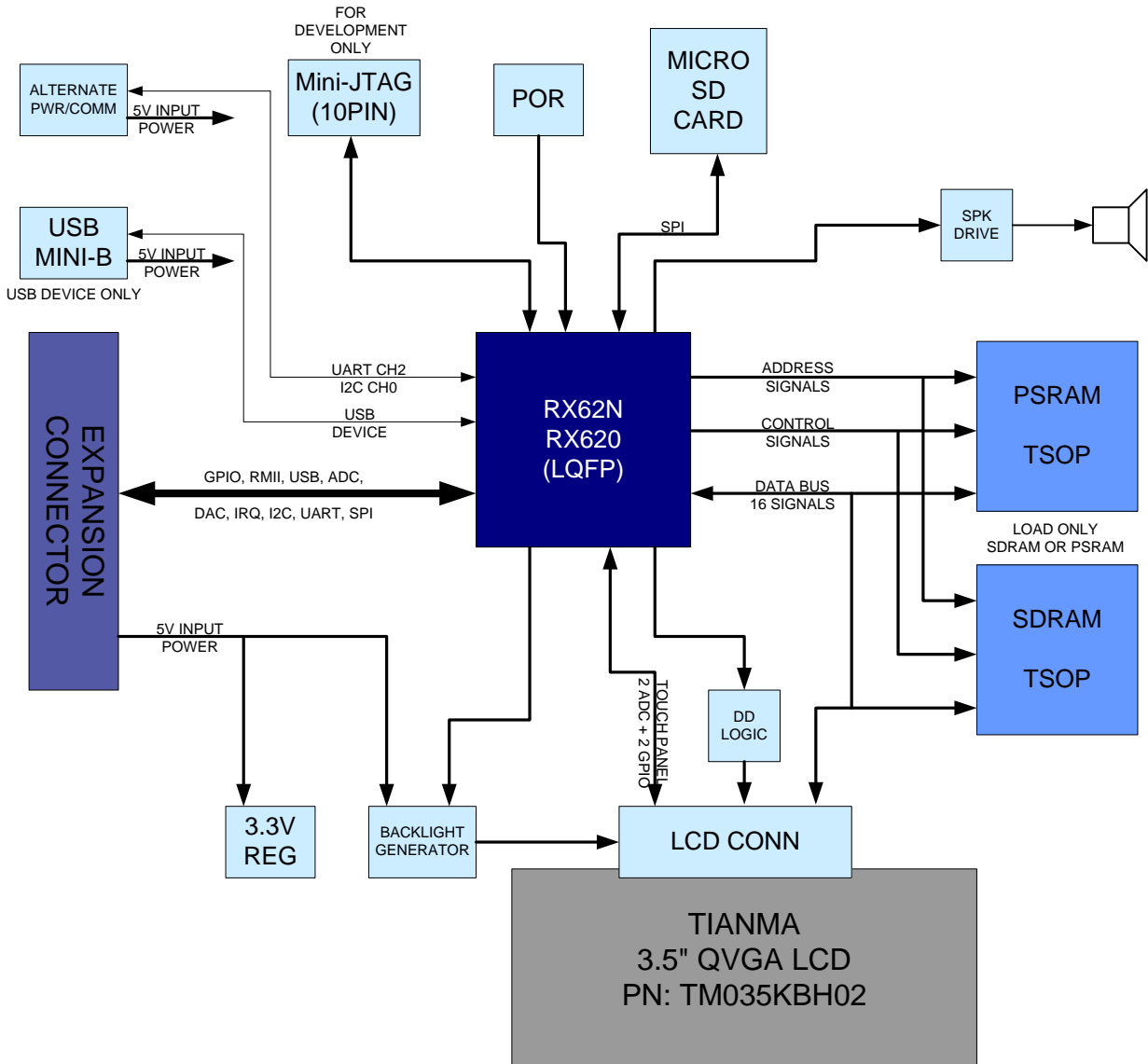


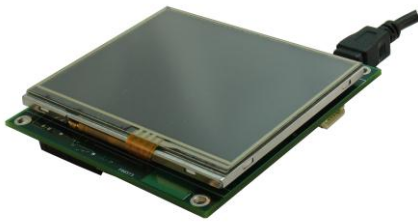
Figure 1 – uEZGUI-RX62N-35QT Block Diagram

### 3. Functional Description

- RX621 or RX62N Microprocessor
- SDRAM 2MB
- Optional PSRAM for low-power applications
- 3.5" QVGA TFT LCD
- On-board Speaker
- Micro SD Card Socket with 2GB card
- Renesas E1/E10A or Segger J-Link-RX JTAG Connector via FDI Mini-JTAG
- Alternate Power/Communications Connector
- Power-on Reset Generator - power-on reset supervisor and voltage monitor with reset switch (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.

## 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:*

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

### **Settings ICON**

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

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

- Speaker test
- LCD color test
- SDRAM size 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 320X240 and 4.44"x3.33" in size and use the file names QSLIDExx.TGA where xx is 00 thru 99. (i.e. QSLIDE01.tga, QSLIDE02.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-RX-35QT,UEZGUI" puts up a title of "uEZGUI-RX-35QT" and loads the slides (QSLIDE01.TGA to QSLIDE08.TGA) from the directory /SLIDES/UEZGUI.

## 7. Software

$\mu$ EZ<sup>®</sup> 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  $\mu$ EZ<sup>®</sup> platform inspires rapid development by supplying customers with an extensive library of open source software, drivers, and processor support - all under a common framework.  $\mu$ EZ<sup>®</sup> 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.  $\mu$ EZ<sup>®</sup> 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.  $\mu$ EZ<sup>®</sup> has three primary categories of components that help simplify embedded application development:

1. **Operating System Abstraction Layer ( $\mu$ EZ<sup>®</sup> OSAL)**
2. **Sub-system drivers ( $\mu$ EZ<sup>®</sup> TCP/IP,  $\mu$ EZ<sup>®</sup> USB,  $\mu$ EZ<sup>®</sup> Driver)**
3. **Hardware Abstraction Layer ( $\mu$ EZ<sup>®</sup> HAL)**

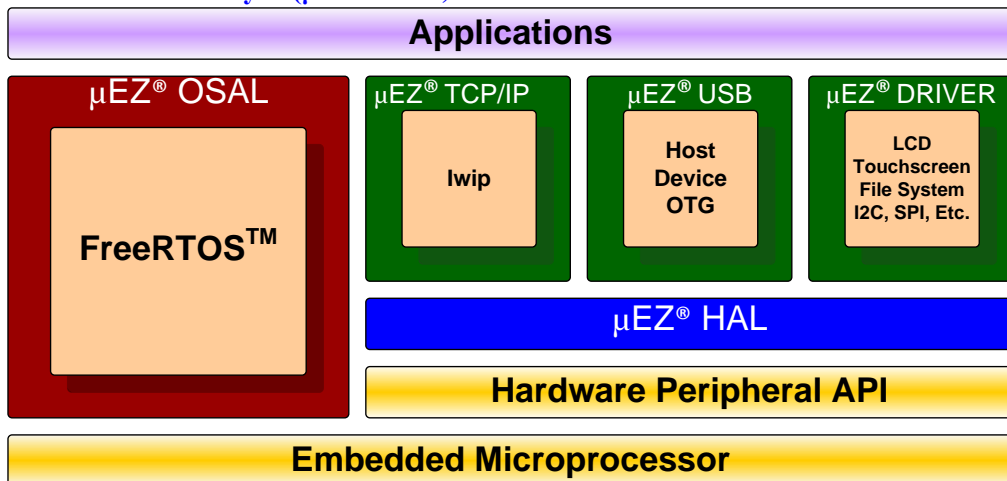


Figure 2 – uEZ Functional Block Diagram

The selection of an RTOS can be one of the most daunting aspects of an embedded system development. With  $\mu$ EZ<sup>®</sup> the primary features of common multi-tasking operating systems are abstracted, thus easing the transition to an open source or low-cost RTOS. The  $\mu$ EZ<sup>®</sup> 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)

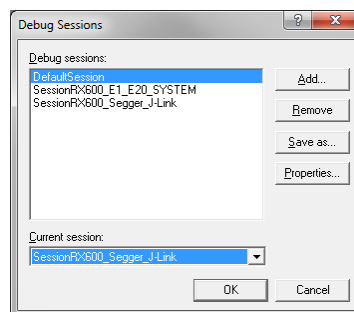
The  $\mu$ EZ<sup>®</sup> sub-system drivers utilize the OSAL functions to provide protected access to the processor peripherals. The sub-system driver API functions are typically protocol layer interfaces (TCP/IP, USB, etc) designed as high-level access routines such as open, close, read, write, etc.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

$\mu$ EZ<sup>®</sup> is ideally suited for Embedded Systems with standard features such as:

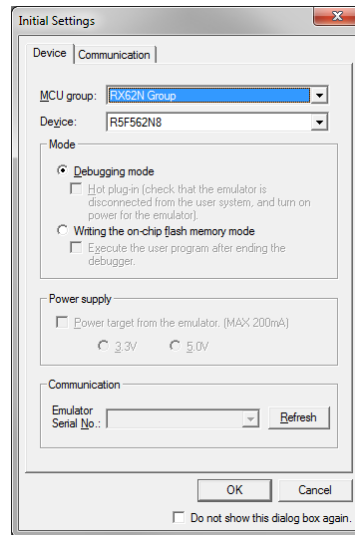
- Processor and Platform BSPs (Board Support Packages)
- Real Time Operating System (RTOS)
- Memory Management
- NAND/NOR Flash
- SDRAM and DDR Memory
- TCP/IP stack
- USB Device/Host Libraries
- Mass Storage Devices
- LCD Displays with Touch Screen
- Input / Output Devices

## 8. Configuring Renesas HEW for J-Link Flashing

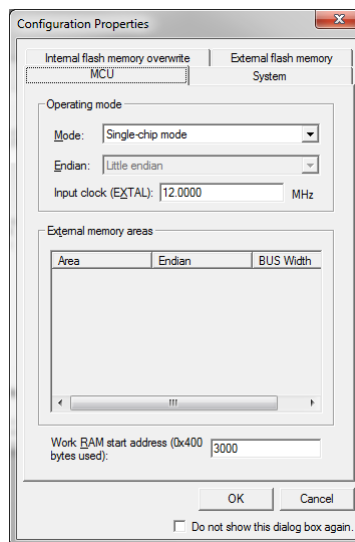
- 1) See the document “ $\mu$ EZ<sup>®</sup> Software Quickstart Guide” for details on how to download the  $\mu$ EZ<sup>™</sup> source code
- 2) Plug in the J-Link device into the PC and install any drivers as directed. If necessary, download the drivers from [http://www.segger.com/cms/J-Link-software.html?step=1&file=J-Link\\_426a](http://www.segger.com/cms/J-Link-software.html?step=1&file=J-Link_426a)
- 3) Plug in the J-Link’s JTAG 14-pin cable to the  $\mu$ EZGUI board connector (J1) with the JTAG adapter.
- 4) If a workspace has not been opened, go to / $\mu$ EZ\_SRC/Build/DK-TS-KIT/DK-57TS-RX62N/RenesasRX and open file “DKTSKITDemo\_RX62N.hws” or any other existing workspace.
- 5) Build the code if not already using **Build->Build** or by pressing **F7**.
- 6) Open Debug->Debug Sessions. Under Current Session, select “SessionRX600\_Segger\_J-Link” and click **OK**. Some older compiler configurations do not have this option. If this is the case, use “SessionRX600\_E1\_E20\_SYSTEM”. If asked to save the previous session, click **No**.



- 7) The following dialog will appear. Make sure the MCU group is “RX62N Group” and Device is “R5F562N8”. On the Communication tab, the JTAG Clock is 16.5 MHz. Press **OK**.

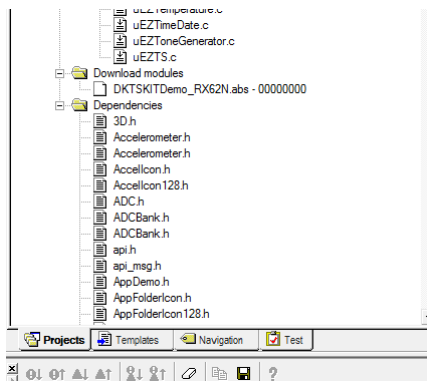


- 8) The Configuration Properties will appear. Confirm the Operating Mode has a Mode of “Single-chip mode” and Input clock (EXTAL) is “12.0000” MHz. The other tabs (Internal flash memory, External Flash memory, and System) use the default values. Then press **OK** to connect to the unit.

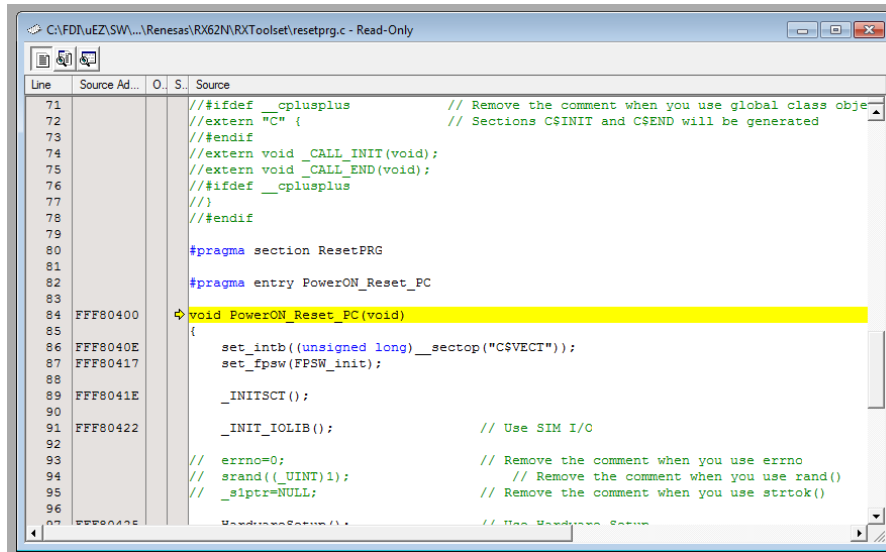


- 9) No errors should appear. The unit is now connected. The next step is to download the code. If the code has been compiled, scroll down in the project explorer and find the image file under “Download modules”. For the DKTSKit Demo code, the file “DKTSKITDemo\_RX62N.abs” should be listed. Right click on this file and select **Download**.





10) The following window should appear. Select Debug->Run (F5) to start execution.



## 9. Functional Test Software

The Functional Test Software tests all the basic features of the uEZGUI-RX-35QT Kit as follows.

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

- 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”
- Memory 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.

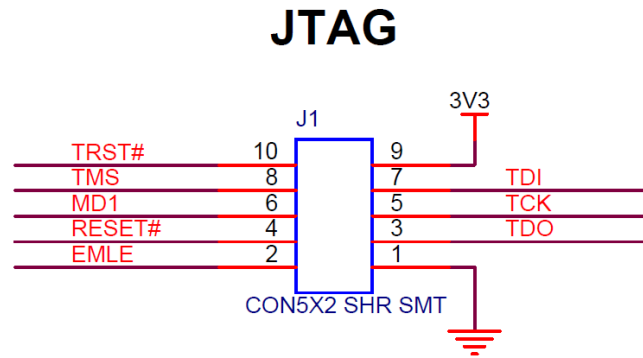
A final report of PASS or FAIL is displayed along with a list of any Skipped and Failed items.



## 11. I/O Connector Descriptions

### JTAG Connector (J1)

The uEZGUI-RX62N-35QT supports debugging/programming of the microprocessor via a standard Mini-JTAG connector. In order to interface to J-Link or E1/E10A JTAG debugger, an additional Mini-JTAG to Standard JTAG adapter board is utilized. The adapter board is available at Digi-Key under the part number J-LINK-RX-AD. (The adapter board is not directly compatible with the uEZGUI-RX62N-35QT-BA Rev 2 but can be modified to work, see the J-LINK-RX-AD User's Manual for details.)



### FDI MINI-JTAG INTERFACE

Figure 4 –Mini- JTAG Connector Wiring Diagram

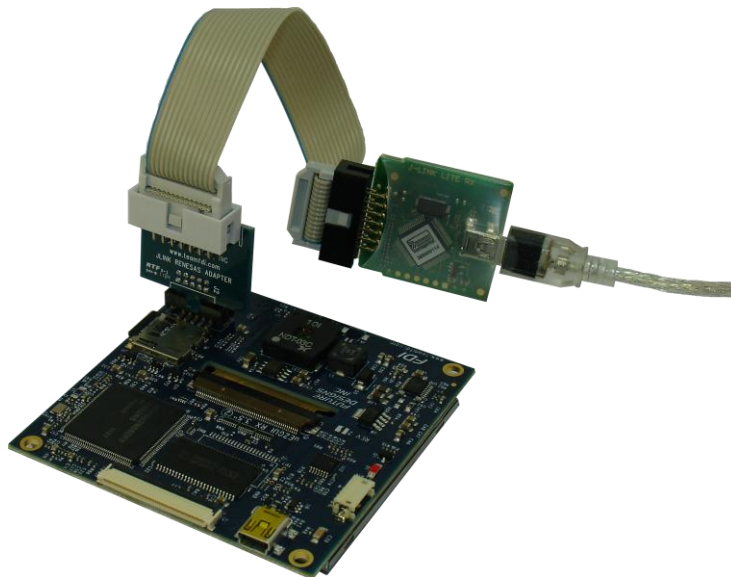


Figure 5 – Mini-JTAG Adapter Wiring Illustration

## Tag-Connect (J7)

The uEZGUI-RX62N-35QT also supports programming the microprocessor via Tag-Connect for J-Link or Renesas E1 or E10A Debuggers.

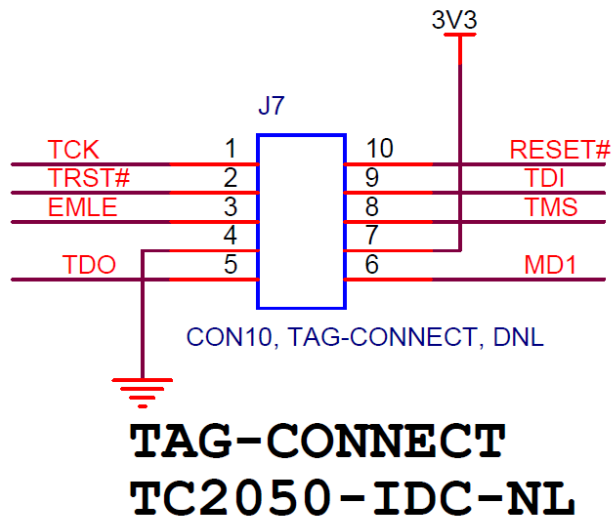


Figure 6 – Tag-Connect Wiring Diagram

Cable P/N: TC2050-IDC-NL

Adapter: <http://www.tag-connect.com/node/46>

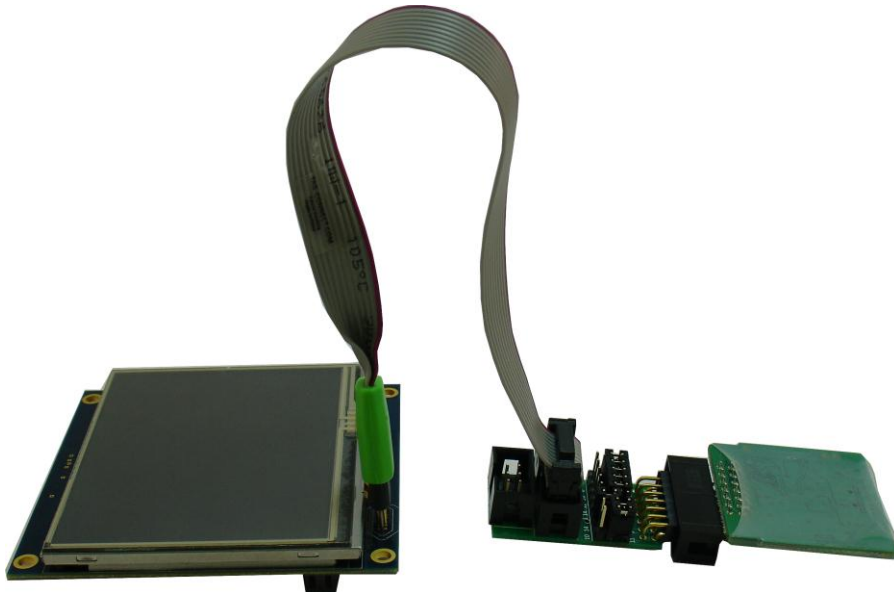


Figure 7 – uEZGUI-RX62N-35QT with optional Tag-Connect interface

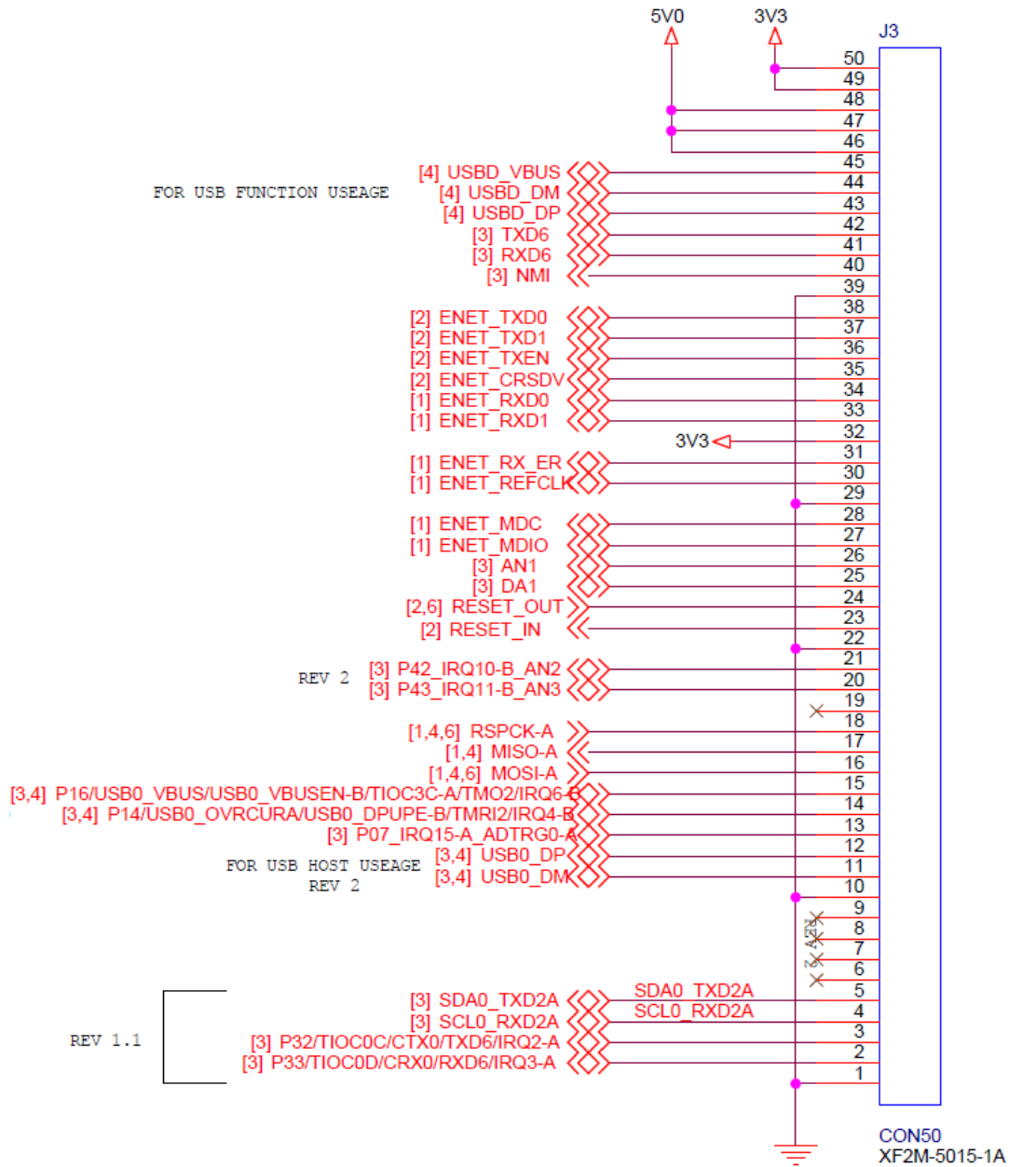
## MicroSD Connector (J6)

When connected to the USB Host port on a PC, the uEZGUI-RX-35QT 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.

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

## Expansion Connector (J3)

The uEZGUI-RX-35QT includes an expansion connector that provide a wide variety of capabilities for user expansion, ranging from 10/100 Ethernet to USB, etc.



## EXPANSION CONNECTOR

Figure 8 – Expansion Connector Illustration

The tables below provide the pin out and signal names available on these connectors:

### J3 Signal Details

Pin #	Pin Name	Pin Description	Input/output
1	GND	Ground	Power
2	P33/TIOC0D/CRX0/RXD6/IRQ3-A	Port 33	I/O
		TIOC0D – MTU Channel 0, Output D	I/O
		CRX0 – CAN Bus Receive Data	Input
		RXD6 – UART 6 Receive Data	Input
		IRQ3-A – Interrupt 3, Input Location A	Input
3	P32/TIOC0C/CTX0/TXD6/IRQ2-A	Port 32	I/O
		TIOC0C – MTU Channel 0, Output C	I/O
		CTX0 – CAN Bus Transmit Data	Output
		TXD6 – UART 6 Transmit Data	Output
		IRQ2-A – Interrupt 2, Input Location A	Input
4	SCL0_RXD2A	IIC Clock Channel 0	Output
		UART Receive Data Channel 2, Input Location A	Input
5	SDA0_TXD2A	IIC Data Channel 0	I/O
		UART Transmit Data Channel 2, Output Location A	Output
6	NC	No Connect	N/A
7	NC	No Connect	N/A
8	NC	No Connect	N/A
9	NC	No Connect	N/A
10	GND	Ground	Power
11	USB0_DM	USB0 (Host) Data Minus	I/O
12	USB0_DP	USB0 (Host) Data Plus	I/O
13	P07_IRQ15-A_ADTRG0-A	Port 07	I/O
		Interrupt 15, Input Location A	Input
14	P14/USB0_OVRCURA/USB0_DPUPE-B/TMR2/IRQ4-B	Port 14 GPIO	I/O
		USB0_OVRCURA/USB_DPUPE-B	I/O
		TMR2 Timer Output	Output
		IRQ4-B Interrupt Input	Input
15	P16/USB0_VBUS/USB0_VBUSEN-B/TIOC3C-A/TMO2/IRQ6-B	Port 16 GPIO	I/O
		USB0_VBUS/USB0_VBUSEN-B	I/O
		TMO2 Timer Output	Output
		IRQ6-B Interrupt Input	Input
16	MOSI-A	SPI Master Output/Slave Input, Output Location A	Output
17	MISO-A	SPI Master Input/Slave Output, Input Location A	Input
18	RSPCK-A	SPI Clock Output, Output Location A	Output
19	NC	No Connect	N/A
20	P43_IRQ11-B_AN3	Port 43 GPIO	I/O
		Interrupt 11, Input Location B	Input
		Analog Input 3	Input
21	P42_IRQ10-B_AN2	Port 42	I/O
		Interrupt 10, Input Location B	Input
		Analog Input 2	Input
22	GND	Ground	Power

23	RESET_IN	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_OUT	Buffered Reset Output from reset circuitry, indicates the microprocessor reset signal directly	Output
25	DA1	Digital-to-Analog Output 1	Output
26	AN1	Analog Input1	Input
27	ENET_MDIO	Ethernet Management Interface Data	I/O
28	ENET_MDC	Ethernet Management Interface Clock	Output
29	GND	Ground	Power
30	ENET_REFCLK	Ethernet RMII Reference Clock Input (50MHz)	Input
31	ENET_RX_ER	Ethernet RMII Receive Error	Input
32	3V3	3.3 volts	Power
33	ENET_RXD1	Ethernet RMII Receive Data 1	Input
34	ENET_RXD0	Ethernet RMII Receive Data 0	Input
35	ENET_CRSDV	Ethernet RMII Carrier Detecion/Data Reception Enable	Input
36	ENET_TXEN	Ethernet RMII Transmit Enable	Output
37	ENET_TXD1	Ethernet RMII Transmit Data 1	Output
38	ENET_TXD0	Ethernet RMII Transmit Data 0	Output
39	GND	Ground	Power
40	NMI	Non-maskable Interrupt	Input
41	RXD6	UART Receive Data, Channel 6	Input
42	TXD6	UART Transmit Data, Channel 6	Output
43	USB_DP	USB (Function/Device) Data Plus	I/O
44	USB_DM	USB (Function/Device) Data Minus	I/O
45	USB_VBUS	USB Device VBUS Input	Input
46	5V0	5.0 Volts	Power
47	5V0	5.0 Volts	Power
48	5V0	5.0 Volts	Power
49	3V3	3.3 Volts	Power
50	3V3	3.3 Volts	Power

Note: The expansion connector signals may have multiple possible functions. Please refer to the RX User's Manual for details on possible alternative functions.

## 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:

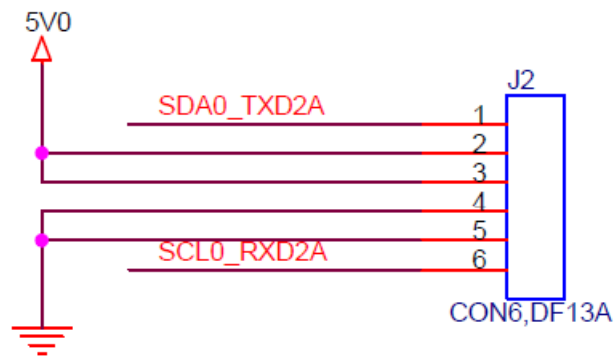
Description	Mfg	Mfg PN	Digi-Key Pn
3" 50-pin 0.5mm	Molex	21020-7650	WM10231-ND
6" 50-pin 0.5mm	Molex	21020-0548	WM10223-ND

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.



## Alternate Power/Communications Connector (J2)

The uEZGUI-RX-35QT includes an alternate power input/communications connector. This connector provides a simple method of providing power to and communicating with the board via I2C or a TTL UART without the use of another PCB assembly or the 50 pin ribbon cable connector.



## ALTERNATE POWER & COMM INTERFACE

Figure 9– Alternate Power & Communications Connector Illustration

### Alternate Power/Communications Connector Details

The alternate power/communications connector utilizes a connector manufactured by Hirose. The Hirose part number for this connector is: DF13A-6P-1.25H(20).

The mating housing for this connector is PN: DF13-6S-1.25C

The crimp pins (26-30AWG, Tin) for the mating housing is PN: DF13-2630SCFA

Digi-Key also offers pre-made wires with the pins already crimped. The Digi-Key part number starts with H4B. These assemblies come in varying colors, lengths, and wire gauge, for example the Digi-Key P/N for a 6" white wire, with pre-crimped tin contact only on one end would be: H4BXT-10106-W8-ND

## 12. Mechanical Details

The following illustrations show the mechanical details of the uEZGUI-RX-35QT PCB (Rev 2 shown)

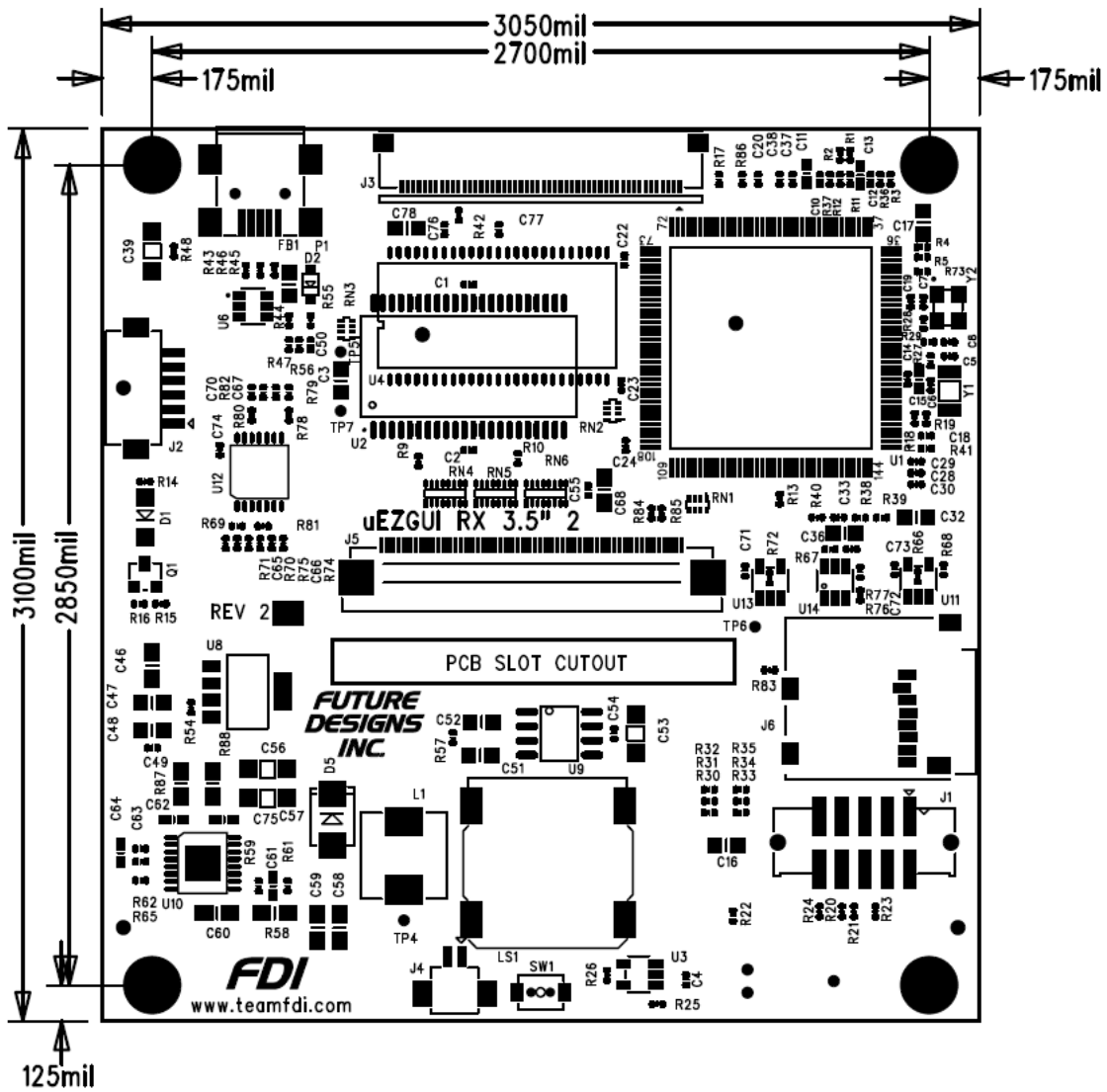


Figure 10 –Mechanical Layout (Component View)

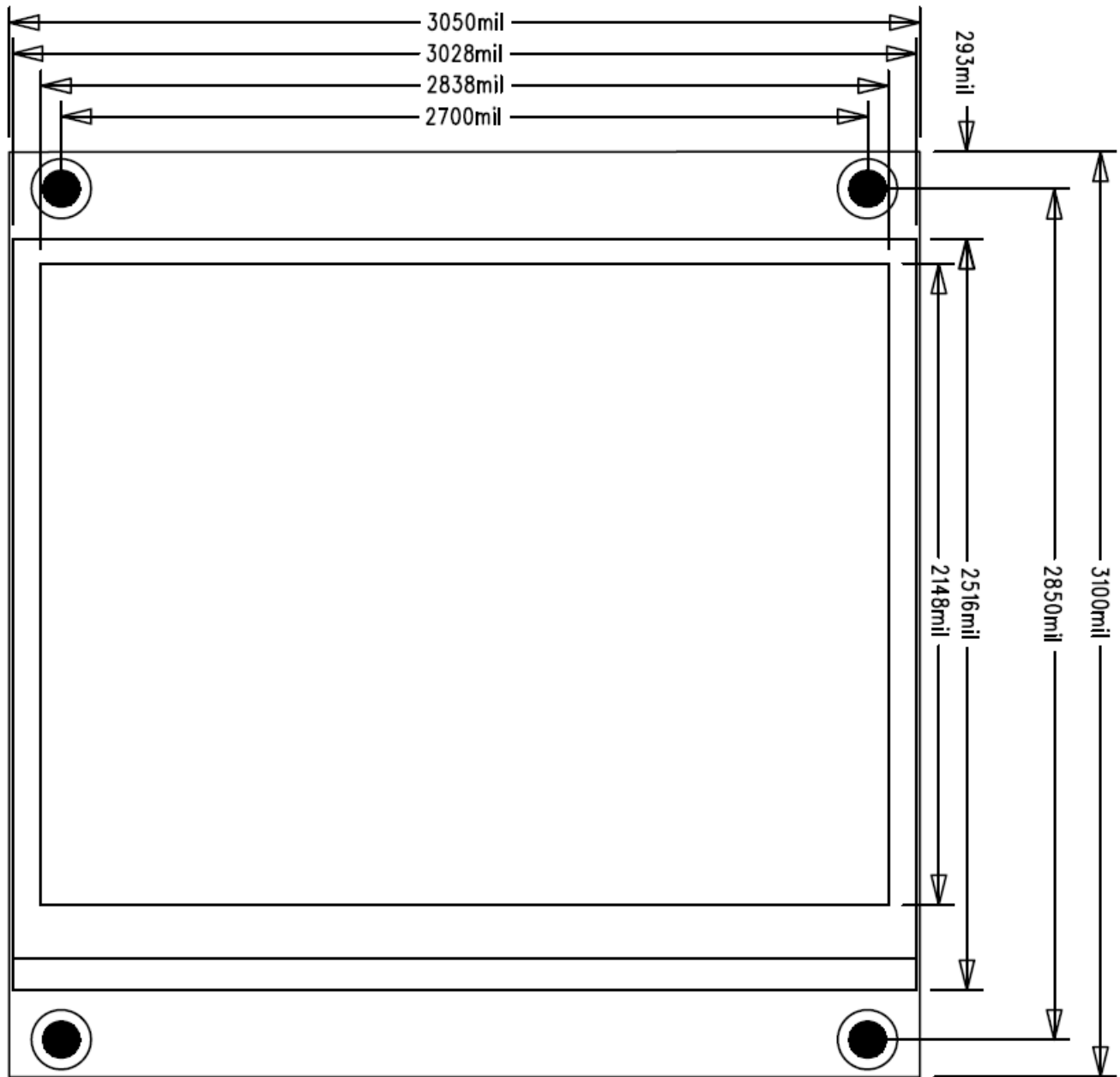


Figure 11 –Mechanical Dimensions (LCD Module View)

### 13. ESD Warning

The uEZGUI-RX-35QT 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.

### 14. Power Requirements

Power is supplied via a USB cable provided in the kit. The following typical power requirements were measured at room temperature with RX62N at 100MHz operating clock rate:

Voltage	Booted at the uEZ Demo Screen	Observed Max
5.0V	440mA	452mA

### 15. Useful links

- Segger Mini-JTAG Debugger
  - <http://www.segger.com/cms/J-Link-software.html>
- uEZ software quick start guide
  - <http://www.teamfdi.com/support/touch-screen.php>

### 16. Schematics

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

### 17. Operating Temperature Range

uEZGUI-RX62N-35QT-BA Board Assembly without LCD: -40°C to +85°C

uEZGUI-RX62N-35QT-BA Board Assembly with LCD: -20°C to +60°C