ezLCD-3xx-EDK
(Engineering Development Kit)
User Manual

Supporting the
ezLCD-3xx Product Family

Earth LCD
FUN!
We Make LCDs Work!™

Revision History

Date	Description
03/14/2012	Initial Release
09/12/2012	Update and add examples and IO definitions.

Table of Contents

EARTHLCD.com

1 Introduction

Thank you for purchasing the ezLCD-3xx Engineering Development Kit. When combining this kit with the ezLCD-301 "Smart" Touch LCD Module, or any of the ezLCD-3xx family of products, it provides a powerful, low-cost development platform. Whether you are a seasoned engineering professional requiring a rapid prototyping environment, or a beginner just starting out, this kit should prove to be equally useful.

The new ezLCD-301, the ezLCD-3xx product family and this Engineering Development Kit (ezLCD-3xx-EDK) reflect the most intense efforts of our 18 year history in the LCD industry and 9th year of ezLCD production. We hope you are as excited about these products as we are!

Randy Schafer
EarthLCD CEO & Fire Starter

3184-J Airway Avenue, Costa Mesa, CA 92626
• 949-248-2333 •

2 About This Manual

Congratulations on the purchase of your ezLCD-3xx, the easiest way to embed a color LCD with (or without) touchscreen into your existing application, project or new product design. Note this manual refers to the model as ezLCD-3xx, as it is a manual that will accommodate the entire ezLCD-3xx family of products. All ezLCD-3xx models support the same I/O connector pin out and command set. The difference is the LCD panel size, resolution, number of displayable colors, and whether a touchscreen is included. The ezLCD-3xx is the third generation of ezLCD developed by EarthLCD, a dba of Earth Computer Technologies, Inc.

This manual discusses the model number ezLCD-3xx-EDK. EDK stands for "Engineering Development Kit". The ezLCD-3xx-EDK is a full-featured development kit that will allow you to connect your ezLCD-3xx to the EDK development board, and bring out /connect up any of the different I/O's and features that you would like to interface with the ezLCD-3xx.

Refer to the ezLCD-3xx **user manual** which contains software, hardware and driver installation instructions and the ezLCD-3xx command list. The ezLCD-3xx family requires you are running Microsoft Windows 7 or Windows XP SP3 on your computer system. For MAC OS X 10.7 (Lion) see Appendix F. For Linux visit **earthLCD.com/ezLCD-3xx** for more information.

We hope to introduce this new third generation of ezLCD products not just to our existing customer base, but also to the Arduino enthusiast, the "Maker" crowd and engineering students who are excited about making their projects as dynamic and exciting as the smart phone they carry in their pocket. Check and see if there is an application note for your host micro on the ezLCD-3xx product page at **earthLCD.com/ezLCD-3xx**.

2.1 One Hundred Dollars - The e.z. Way!

Updating technical documentation at EarthLCD is a continuous process. Our goal is to provide easy-to-use and well-documented products. Over our nearly 20 year history, some of the best ideas have come from our customers. We appreciate your suggestions. Please email docs@earthlcd.com with the title of this manual in your subject line and give us suggestions for making the manual better or general corrections you see that are needed and you will be entered into a quarterly drawing for $100 worth of Earth purchase credit!

3 How the ezLCD-3xx Works

The ezLCD-3xx Smart LCD consists of an LCD module and a controller board containing the graphics processor, memory and interfaces. The ezLCD-3xx contains USB, serial ports, I2C, SPI and I/O pin interfaces. A 4 megabyte USB flash drive on the controller board is used for storing macros, fonts, and images. The drive also includes drivers, utilities and product documentation. To develop projects and configure the ezLCD-3xx, you simply need a terminal program running on a computer set to 115,200 baud rate, 8 data bits, no parity, one stop bit, local echo and CR=CR+LF. Plugging the ezLCD-3xx into a USB port achieves the following:

1. **Powers the ezLCD-3xx**
2. **Connects the ezLCD USB flash drive to your computer**
3. **Opens a USB CDC COM port connection if not overridden by the startup macro**

The ezLCD-3xx is driven by ASCII commands sent to the Command Port. The Command Port can be either the USB CDC device or one of three serial ports on the ezLCD I/O connector.

[Note: By default the Command Port is set to USB by the **STARTUP** macro in the ezSYS\MACROS directory of the ezLCD-3xx Flash Drive]

The ezLCD-3xx is capable of running as a standalone controller. However, many ezLCD-3xx customers will use the ezLCD-3xx as the user interface in their design and use a dedicated micro-controller chip or board (PIC, ARM, AVR, Arduino, BASIC Stamp, SBC) to do their control functions. The micro-controller would typically communicate to the ezLCD-3xx through a serial port.

The ezLCD-3xx is designed to require the least amount of system-dependent software in order to develop programs as quickly as possible. ASCII commands allow any standard terminal program to talk to the ezLCD for demonstrating and learning. By configuring a terminal program to talk to the ezLCD CDC Device (COM Port) you are able to use your PC to send commands directly to the Command Port. The Flash Drive allows for bitmaps, macros and fonts to be stored on the ezLCD-3xx for rapid access. This makes graphics performance independent of host speed. A standard USB flash drive interface is automatically configured on most computers with a USB port using the built-in MSD driver. The serial interface uses a built-in CDC driver when connected through the USB. The CDC driver is already installed on most computers. Under Windows the driver only requires the **ezLCD.inf** file (which is included on the ezLCD-3xx Flash Drive) for configuration.

Unlike LCDs with built in frame buffers, the ezLCD is a full blown smart LCD client. With its versatile programmability, built-in widgets, flash based fonts and images you can create an analog meter readout for your project in minutes while only using 100 bytes of your host micro-controller board!

Performance is not limited by your host!

4 Package Contents of the ezLCD-3xx-EDK

The ezLCD-3xx-EDK is a full featured engineering development kit which includes:

- One (1) ezLCD-3xx Development Board
- Two (2) 5 Pin Mini USB to Type A 2.0 USB Cables – 6 Ft. ea.
- One (1) 3.7v Lithium Battery
- One (1) Screwdriver
- Six (6) Threaded Standoffs
- Ten (10) Jumper Shunts

5 Key Features of the ezLCD-3xx-EDK Development Board

The ezLCD-3xx-EDK development board was designed to accommodate the ezLCD-301 and future ezLCD-3xx models. It contains the following features:

- ezLCD-3xx family mating connector (Hirose DF11CZ-16DS-2)
- Mini-USB serial port (USB to serial bridge (MCP2200))
- Mini-USB CDC/flash drive port
- ezLCD-301 / 3xx can be powered through either of the above mini-USB ports
- I²C temperature sensor (LM175)
- I²C ambient light detector (ISL29003)
- I²C memory provisions (unpopulated pad for AT24C1024)
- 3.7v lithium battery charger with LED indicator, 1.25mm and 2.0mm connectors
- Lithium battery on/off switch
- Wireless support via SPI
- Piezo buzzer and an external buzzer connector
- LED drivers – LED's on every I/O Pin
- RS232 interface/level shifter (DB9 Female) and RS485 interface/level shifter
- 40 pin (8 x 5) Interface jumper matrix
- "Side Wire Entry" 10 pin terminal block with LED indicators
- "Side Wire Entry" 10 pin terminal block for RS232 / RS485 / I²C wire connection
- Built in 10 : 1 voltage divider
- Reset button
- 12 mhz crystal
- Two unpopulated resistor pads
- Mechanical outline of 3.465 in. (88mm) x 2.20 in. (56mm)
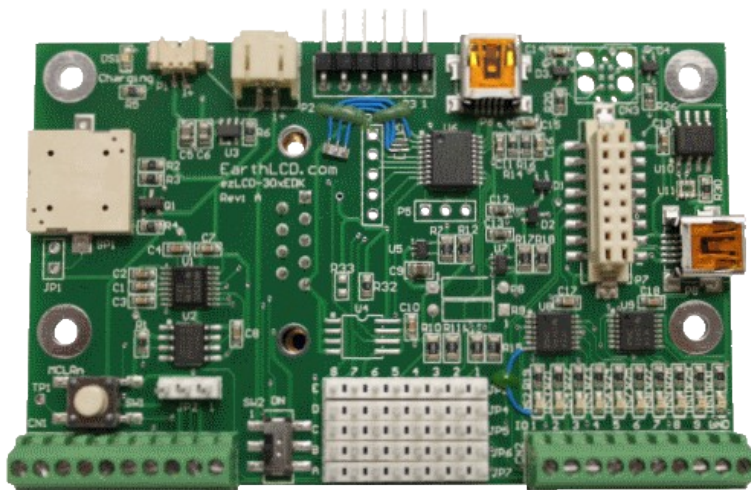
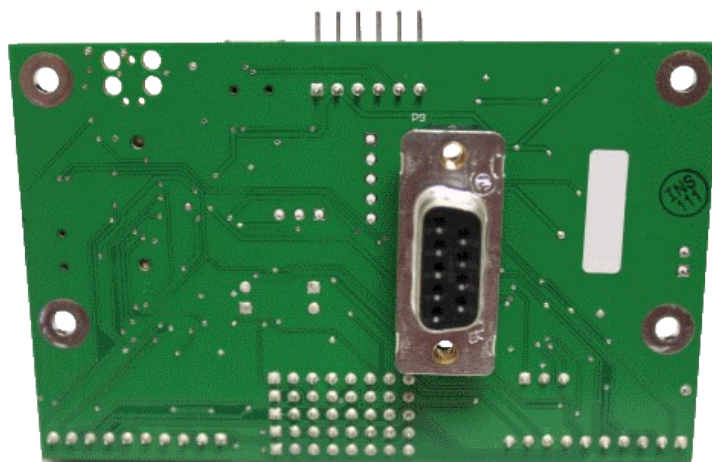# 6 ezLCD-3xx-EDK Development Board Images

Figure 1: Front

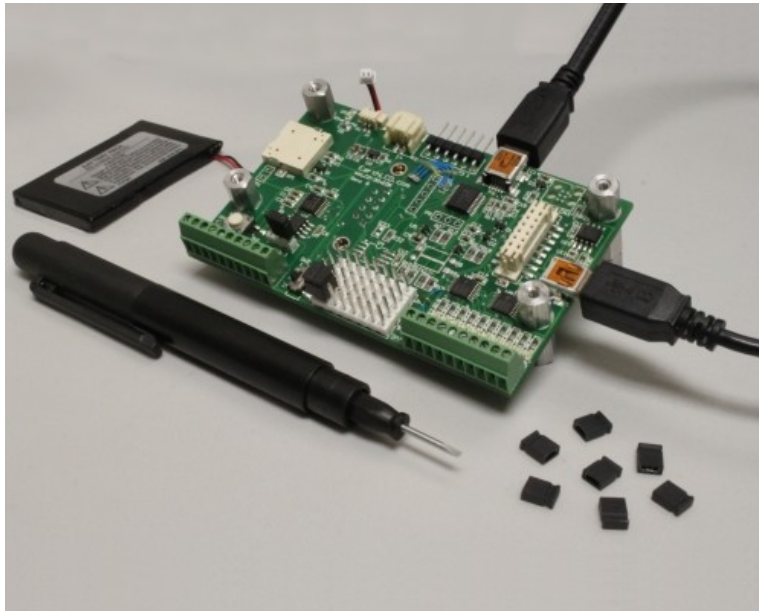*Figure 2: Back*

6.1 ezLCD-3xx-EDK Development Kit Images

Figure 3: ezLCD-3xx-EDK Complete Kit
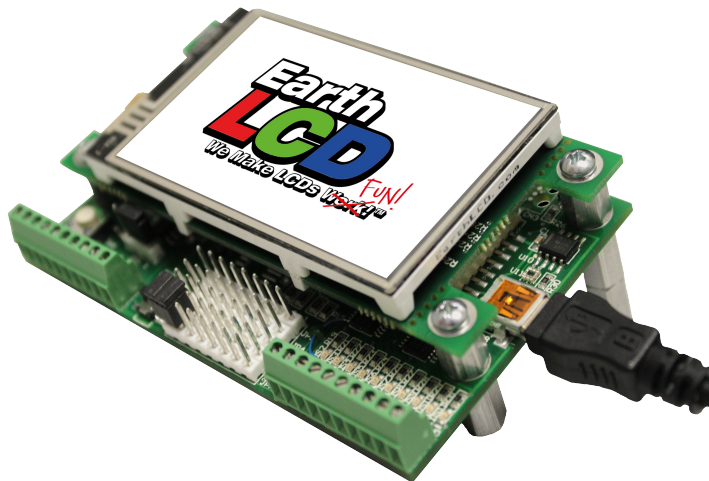
Figure 4: ezLCD-3xx-EDK with ezLCD-301 attached
(Order as ezLCD-301-DK)

EARTHLCD.com

6.2 ezLCD-3xx Development Board

Figure 5: Front with Selected Component Descriptions

Lithium Battery Connectors
Connector

Mini USB Serial Port

ezLCD-3xx Mating

Temp Sensor (u10)

Ambient Light (u11)

Mini USB Flash Port

Buzzer

Jumper JP2

Reset Button

LED Indicators

Terminal Block CN1

Terminal Block CN2
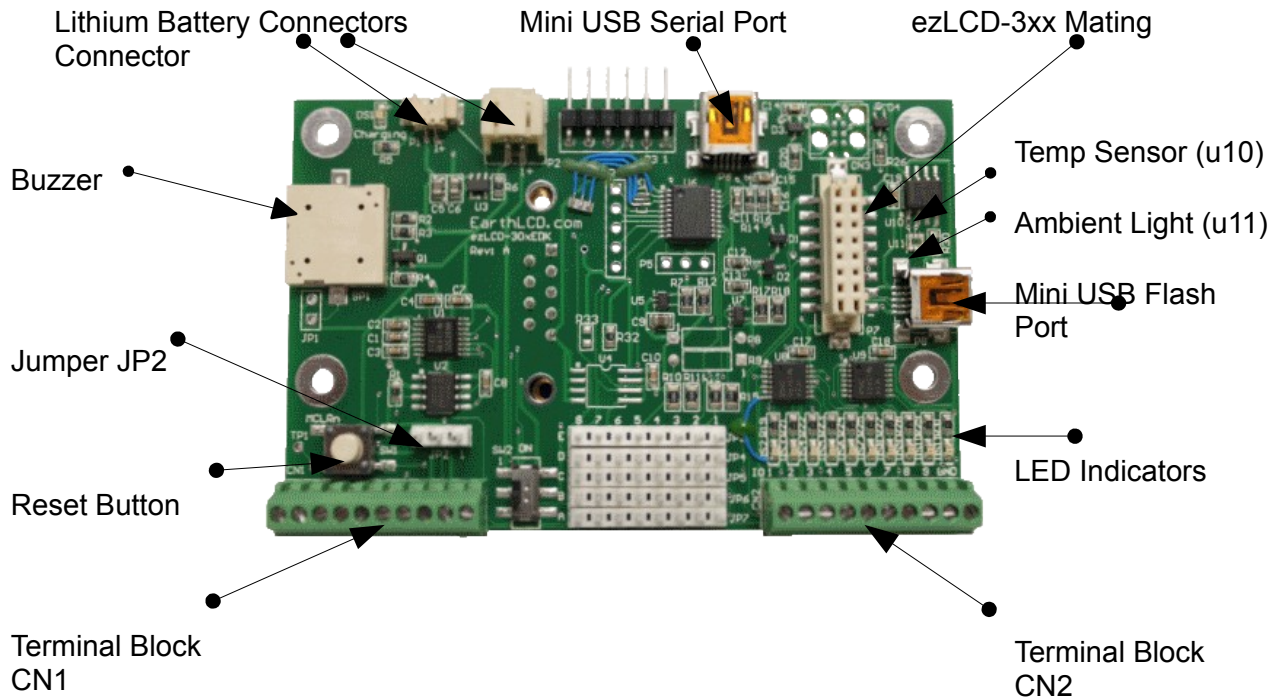
7 ezLCD-3xx-EDK Block Diagram

3184-J Airway Avenue, Costa Mesa, CA 92626
• 949-248-2333 •
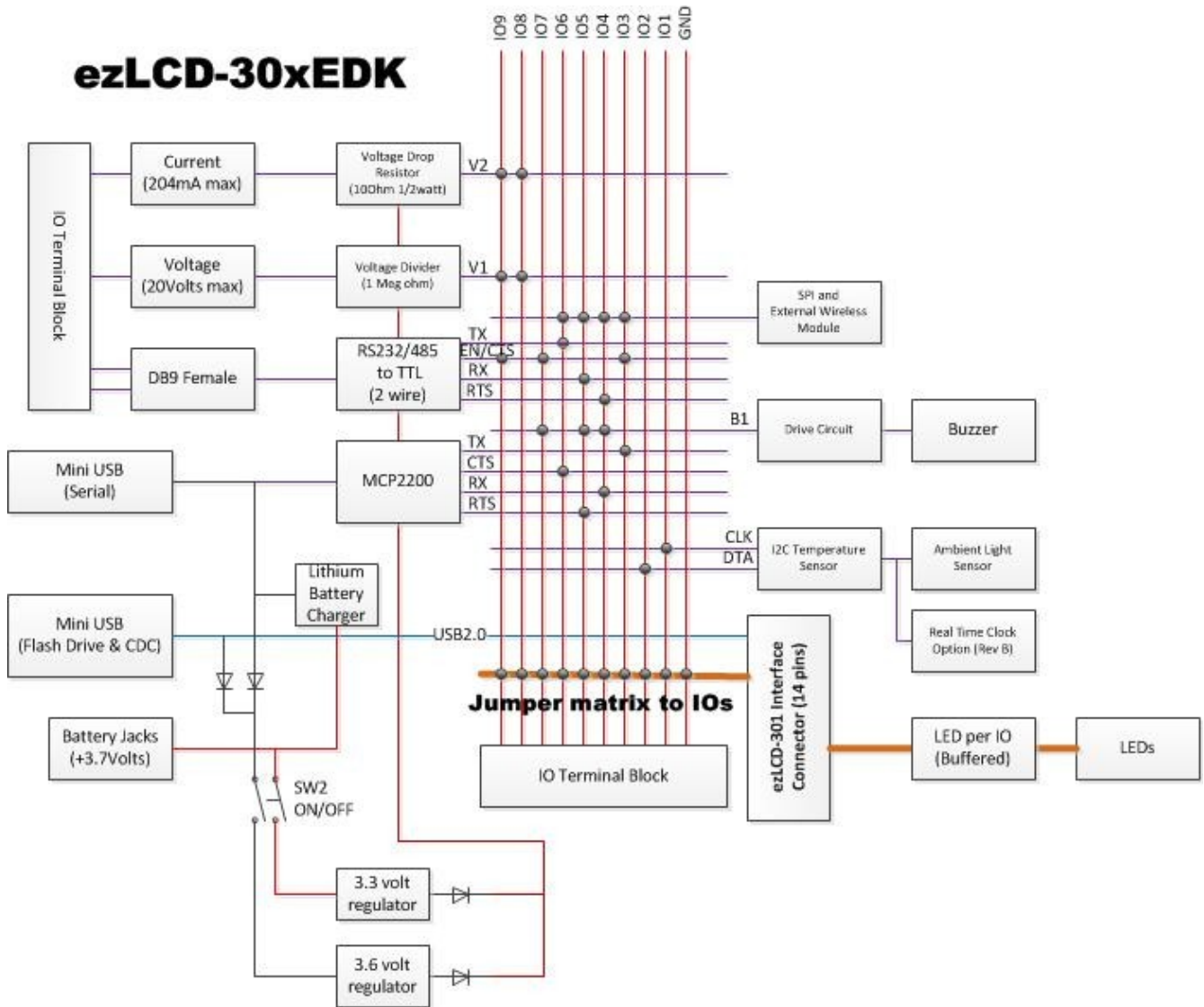
8 ezLCD-3xx-EDK Pin Assignments

8.1 40 Pin Jumper Matrix

	8	7	6	5	4	3	2	1	
E	SCL	SDA	GND	VINBdiv10	GND	GND	VINAdiv10	GND	JP3
D	I/O 1	I/O 2	TXA	I/O 8	RTS	CTSA	I/O 9	RXA	JP4
C	CTS	RTS		RTSA	BUZZER		CTS	CTS	JP5
B	I/O 3	I/O 4	BUZZER	I/O 5	I/O 6	CTSA	I/O 7	CTS485	JP6
A	TXA	RXA		RX	TX		BUZZER		JP7

8.2 CN2 (Right) Terminal Block Pin Assignments

1	2	3	4	5	6	7	8	9	10
I/O 1	I/O 2	I/O 3	I/O 4	I/O 5	I/O 6	I/O 7	I/O 8	I/O 9	GND

8.3 CN1 (Left) Terminal Block Pin Assignments

1	2	3	4	5	6	7	8	9	10
CTSD	TXD	RTSD	RXD	RS485 Datan	RS485 Data	VCC	SDA	SCL	GND

RS232   RS485   I²C

8.4 JP2 - Jumper Pin Assignments

1	2	3
RX232	RX	RX485

8.5 P7 - ezLCD-3xx Mating Connector Pin Assignments

Signal	Pin	Pin	Signal
VBUS1	1	2	USB1D-
GND	3	4	USB1D+
I/O 2	5	6	I/O 1
I/O 4	7	8	I/O 3
I/O 6	9	10	I/O 5
I/O 8	11	12	I/O 7
MCLRn	13	14	I/O 9
GND	15	16	VCC3.3

8.6 40 Pin Jumper Matrix: Jumper Shunt Default Settings
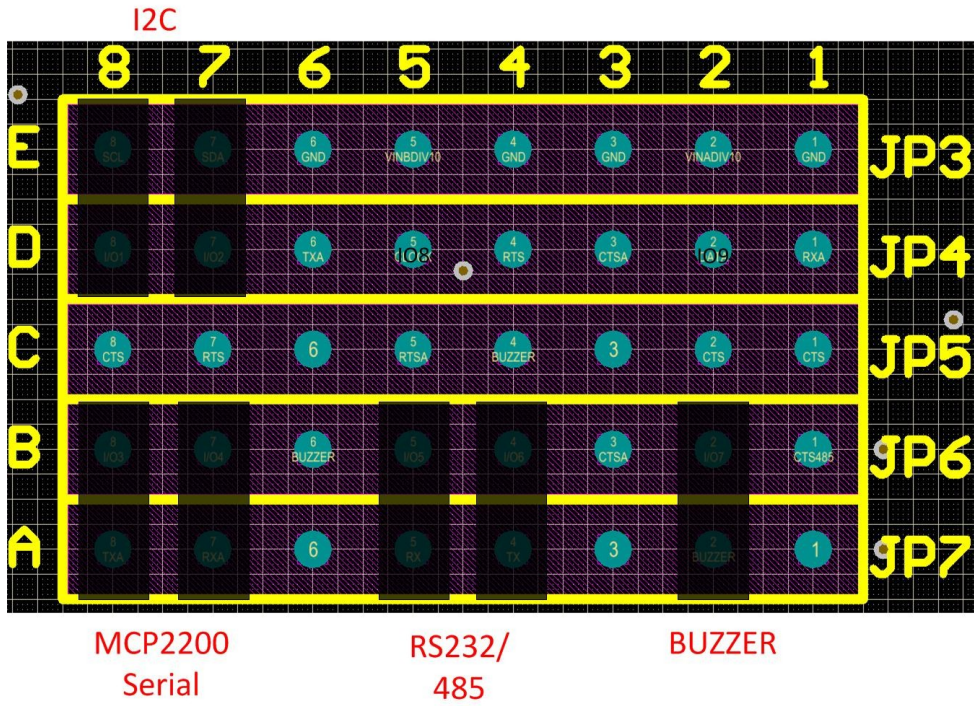
9 IO Definitions

IO	Analog	Peripheral	Digital	EDK Default
1	No	No	Yes	I2CCLK
2	Yes	Yes	Yes	I2CDTA
3	No	Yes	Yes	UARTRX
4	No	Yes	Yes	UARTTX
5	Yes	Yes (In only)	Yes	UARTRX232/485
6	Yes	Yes	Yes	UARTTX232/485
7	No	No	Yes	Buzzer
8	Yes	Yes	Yes	VINB
9	Yes	Yes	Yes	VINA
10 to 33	No	No	Yes	None

Usage is with the CFGIO command.

CFGIO 1 I2CCLK for example assigns the I2CCLK to IO number 1.

When you use the I2C command this is the pin that wiggles as the I2C Clock.

10   Examples

10.1   Configuration on EDK

Configuring the RS232 serial on the EDK:

    CFGIO 4 serial3_RX 115200 N81
    CFGIO 3 serial3_TX 115200 N81
    CMD serial3
Jumper JP2 pin 1 to 2

Configuring the RS485 full duplex serial on the EDK:
    CFGIO 4 serial3_RX 115200 N81
    CFGIO 3 serial3_TX 115200 N81
    CMD serial3
Jumper JP2 pin 2 to 3

10.2   Reading Temp sensor on EDK

    'Read the temp off the edk board
    CFGIO 1 I2CCLK
    CFGIO 2 I2CDTA
    LET A=&h90
    I2COUT(A,0x00)
    LET B=i2cack   'check i2cack 1=ack 0=nack
    CPRINT "i2cack -> ";B
    loop:
          I2CIN(&h91,T,Z)
          LET B=i2cack
          LET A=ctof(T)   'convert Celsius to Fahrenheit
          CPRINT "Temp in Celsius ";T;" in Fahrenheit ";A,B
    GOTO loop

10.3   BEEPER on EDK

    CFGIO 7 BEEPER
    'BEEP FREQUENCY, TIME (in millisec)
    'beep for 2 seconds at 2KHZ
    BEEP 2000 2000

10.4   Reading Ambient Light sensor on EDK

    TBD
    'Read the temp off the edk board
    CFGIO 1 I2CCLK
    CFGIO 2 I2CDTA