Device: PLT-1002

This document Version: 1.0

Date: June 2010

Description: Development platform for Wireless Temperature Sensor and 802.15.4 experimentation

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Introduction

The PLT-1002 is a Microchip PIC18F25K20 based platform that gives you everything you need to experiment with wireless mesh networks, temperature sensors, and the latest of microcontrollers.

Features

The PLT-1002 features PIC18F25K20 clocked at 16Mhz (PLL enabled up to 16mips), a TMP75 temperature sensor, and the ability to connect an MRF24J40MB IEEE 802.15.4 wireless module.

The PLT-1002 is powerful enough to run as a router within a wireless mesh network. With 32k of flash and nearly 1.5k of RAM, you'll have plenty of space to run a mesh networking stack. All unused pins are broken out for easy access.

Hackability

The PLT-1002 is 100% hackable.

At EA, we believe you have the most fun when you have the most control over your hardware. For the PLT-1002 we provide a datasheet, complete schematic and complete source code. After that, it's all up to you. We'd love to hear about the projects you're using it for – send us information and photos to myproject@embeddedadventures.com

Construction

Please see the "Building Kits" section under Tutorials on the EA web site – www.embeddedadventures.com

Connections

The PLT-1002 has three connection ports.

SERIAL	TTL level serial port
ICSP	Programming port for PIC
EXPANSION	Breakout of all unused pins

Power

The PLT-1002 provides a terminal block for power input and will happily run at 3v if you want to run from battery power. The 18F25K20 is rated down to 1.8v, but only at 16Mhz. To run at 64Mhz, you will need to run it at least 3v (up to about 3.5v). The MRF24J40MB will run between 2.4v and 3.6v.

Buttons

The PLT-1002 has two buttons.

One connected to RE3 (MCLR). This allows it to function as a reset button, which is great during development. During deployment, however, you may find that it is more useful to actually have a functioning push button. In this case, you will need to change the config fuses so that the pin functions as RE3 and not MCLR. Please see the PIC18F25K20 datasheet for more information.

The other button is connected to RA4 and includes a capacitor to reduce debounce noise, and a pull up resistor. To check for a button press, set RA4 as an input and look for it to go to 0 (press) and then back to 1 (release).

Indicators

The PLT-1002 has three LEDs connected to RA0, RA1 and RA2. You can use these for your own nefarious purposes.

Temperature Sensor

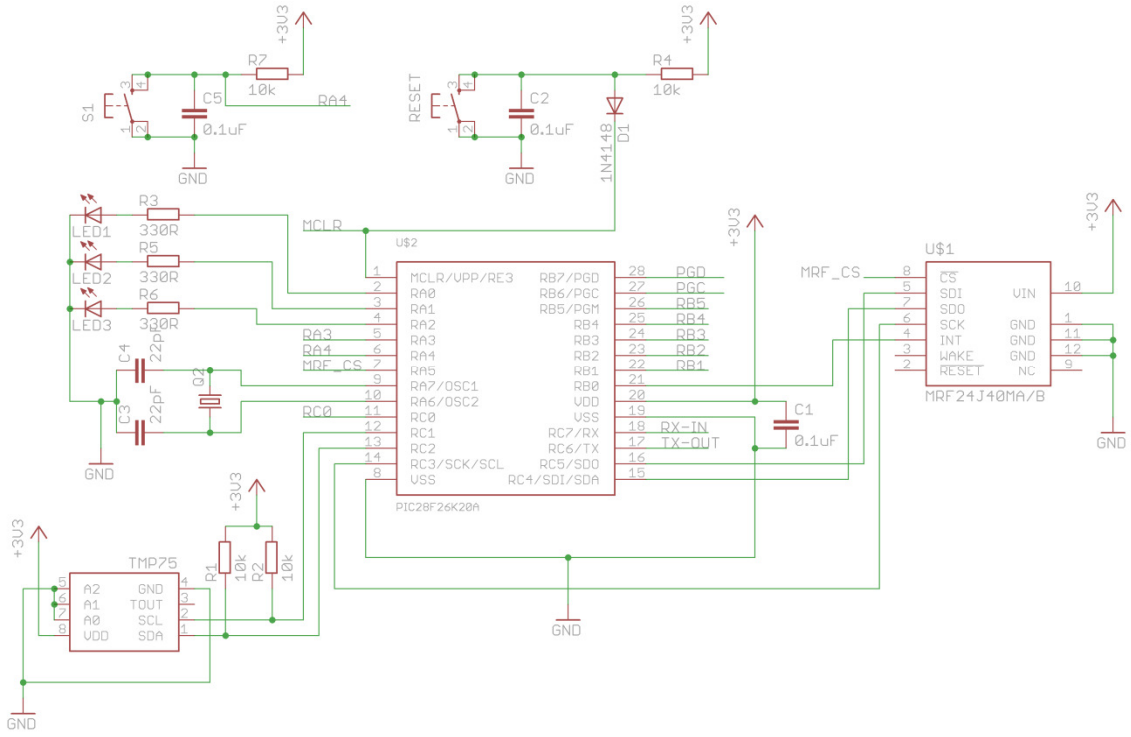
A TI TMP75 temperature sensor is available over an i^{2}c buss. The i^{2}c buss is connected to RC1 (SCL) and RC2 (SDA).

Wireless Module

The MRF24J40MB module is a high power IEEE 802.15.4 Wireless Personal Area Network (WPAN) module. It takes care of a whole bunch of stuff if you want to communicate wirelessly, and makes it very easy to create your own mesh network on top of 802.15.4. Zigbee is certainly possible – Microchip has a free Zigbee stack that works with their compilers. At EA, we've worked with some of the smartest people in the open source community to create our own wireless mesh technology, known as ITS. It features a completely royalty-free, open source specification, and as usual, completely free source code. There will be tutorials on the EA website soon, if not by the time you read this.

Schematic

Microcontroller

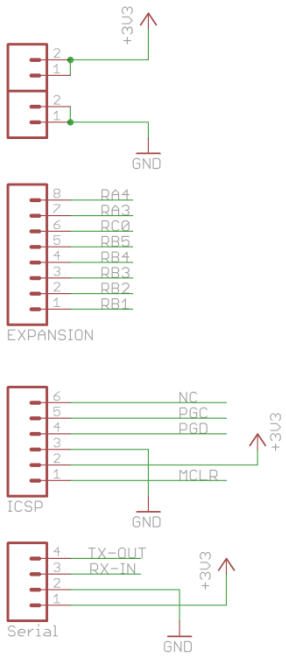


A reset button pulls MCLR to ground when pressed, with C2 designed to prevent debounce noise. D1 prevents programming voltages on MCLR/VPP reaching the +5V buss. C3, C4 and crystal allow the PIC to run at 64Mhz (via the PLL), or 16mips. C1 is a power supply bypass for the PIC.

Initial prototypes of this board were done with the PIC18F26K20, however due to a world-wide shortage of these chips in production quantities, we have initially launched with the PIC18F25K20, which has less flash and RAM but allows us to produce the kit at a lower price.

Connections

The PLT-1002 provides a set of four breakout pins to provide the board with 3v power. The Serial port provides TX (out from the board) and RX (in to the board), along with ground and Vcc connections if required. Note that if you are connecting a serial connection to the board, you will typically connect TX on the PLT-1002 to RX on your external serial connection, as well is RX on the PLT-1002 to RX externally.

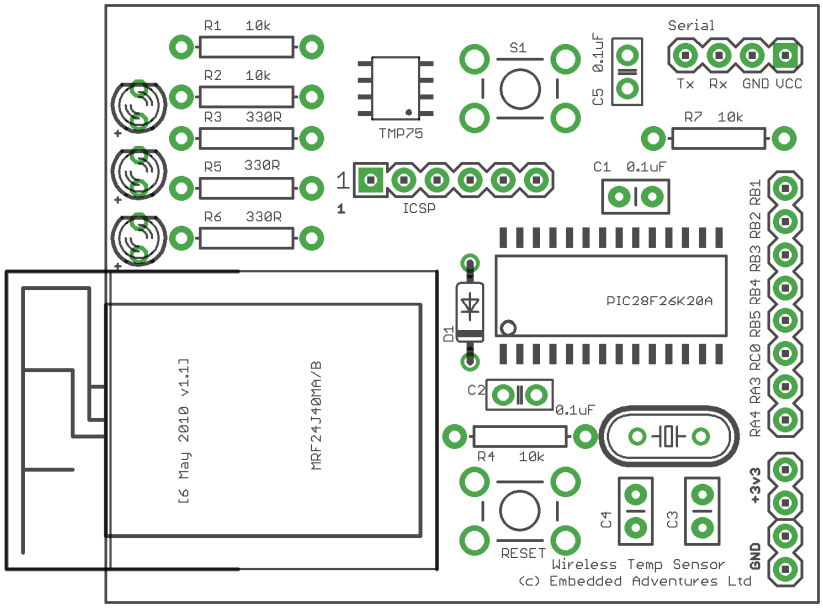


The Expansion board breaks out all remaining pins that are not used elsewhere. You have access to RA3, RA4, RC0, and RB5 through RB1. This allows connection to external devices such as humidity or pressure sensors to expand the capability of the board.

The ICSP port allows access to PGC (RB6) PGD (RB7) and MCLR. If ICSP is not being used, RB6 and RB7 are available for other uses.

ICSP allows you to program the 18F26K20 using the Pickit or ICD compilers from Microchip. Typically, this is only necessary in order to get bootloader on the microcontroller, but your requirements may be different.

PCB



The board is designed to allow you to construct the entire project by hand soldering. Even the surface mount parts are not difficult. Please see the "Building Kits" section under Tutorials on the EA web site – www.embeddedadventures.com – for more information.

Versions

Version	Date	Comments
Version 1.0	10 June 2010	Initial Version for board v1.1