

Name _____

Lab Section _____

PIC – Blinking an LED using a time wasting loop (PIC Dev 14 Surface Mount)

Lab 3

Introduction: The equivalent of the “Hello World” program on an embedded system is often a blinking LED. In this lab you will work on a blinking LED application using a time wasting loop. The time wasting loop is not an efficient method for measuring long segments of time, However it does serve as a good introduction to microcontroller programming.

Lab Requirements:

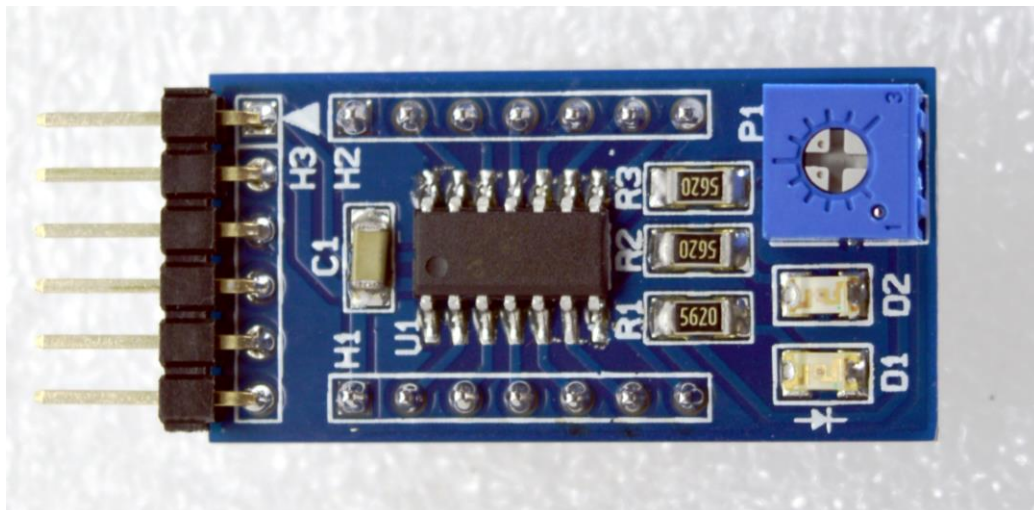
1. Demonstration of blinking LED application:
Modify the supplied code so the LED blinks at the rate of the last digit of your RedID. If your RedID ends in 0 do 10Hz. Demonstrate the proper frequency ($\pm 0.1\text{Hz}$) of oscillation using the oscilloscope.

Demo Check (JK) _____

About the PIC Dev 14:

To get started with this lab you will need to assemble a small development board for the 14-pin PIC microcontroller. This board was designed to simplify the task of getting started with a bare microcontroller by including some minimal support circuitry. The board be used in all of the basic PIC programming labs as well as for the mini-project. The PIC Dev 14 board provides an interface for programming 14-pin PIC microcontrollers in addition to an LED and trim pot for performing simple experiments. Access to all the microcontroller pins is available on two headers spaced to fit on a standard breadboard.

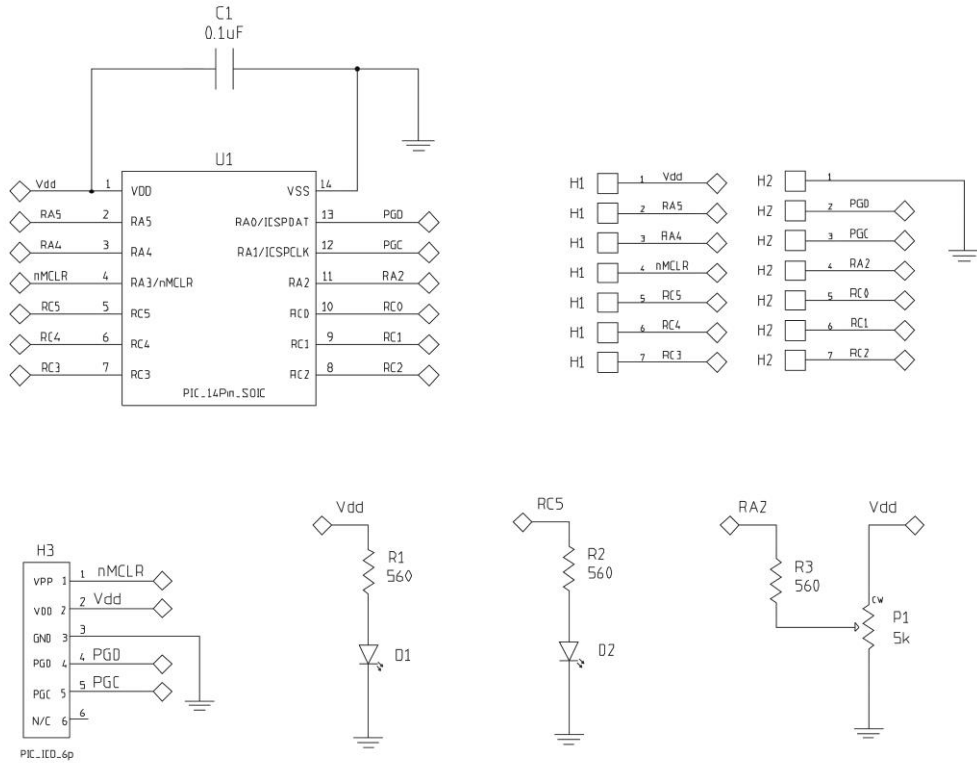
PIC Dev 14 SMD Assembly



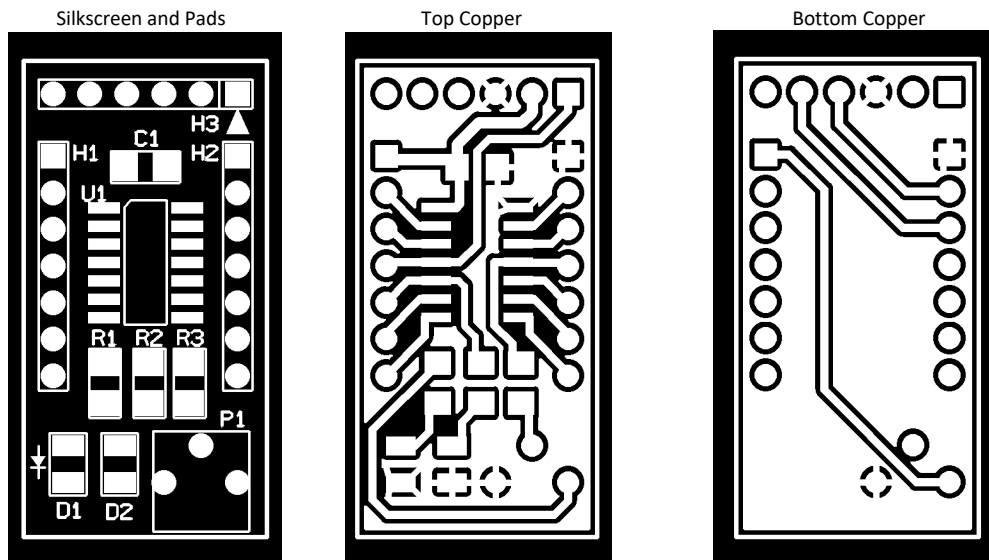
Construction:

Review the schematic and board layout then solder the surface mount parts to the pcb. Bes sure to place the IC and LEDs in the proper orientations. Once all of the SMD parts are assembled finish up by solder the headers and trip pot.

PIC Dev 14 SMD Schematic:



PIC Dev 14 PCB:

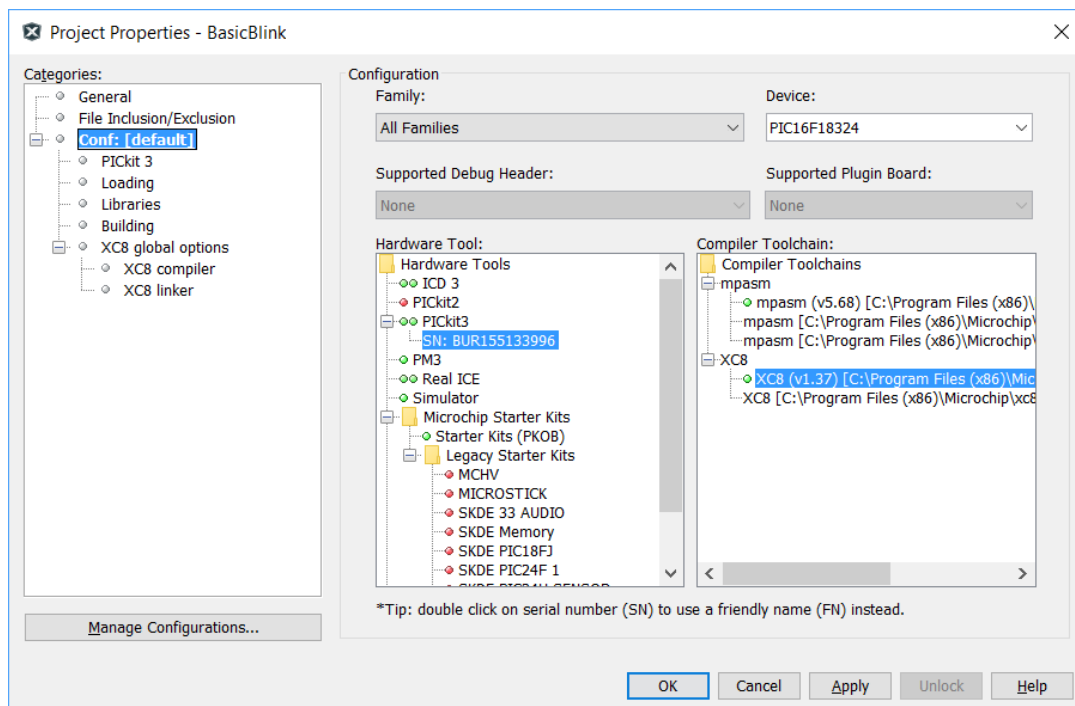


Connect the PICkit 3 programmer to the 6-pin programming header with the arrow on the programmer facing pin 1 of H3 (see photo below). You do not need to connect the *PIC Dev 14* to a DC power supply when using the PICkit 3. The PICkit 3 can provide up to 30mA to power the target board.

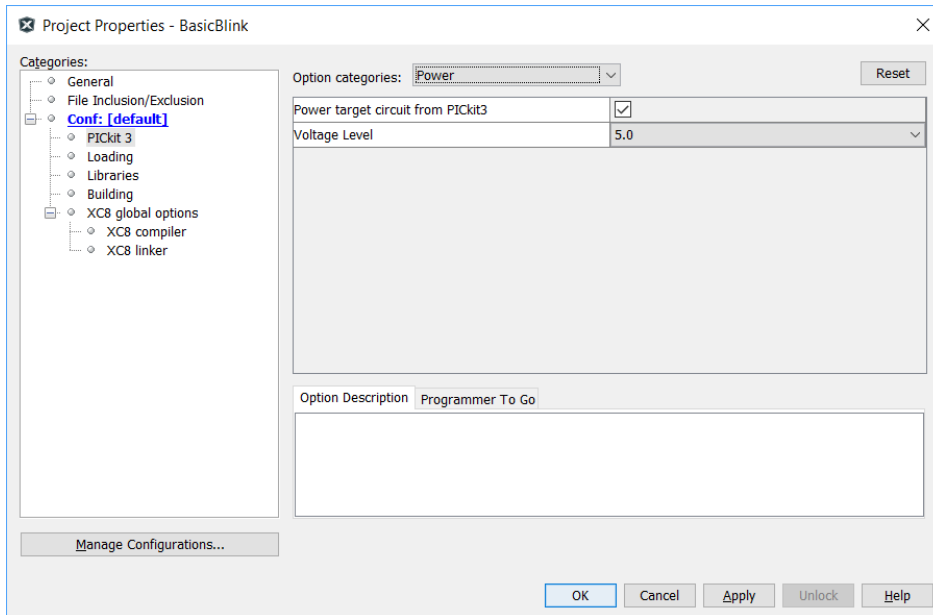
PICkit 3 Programmer:



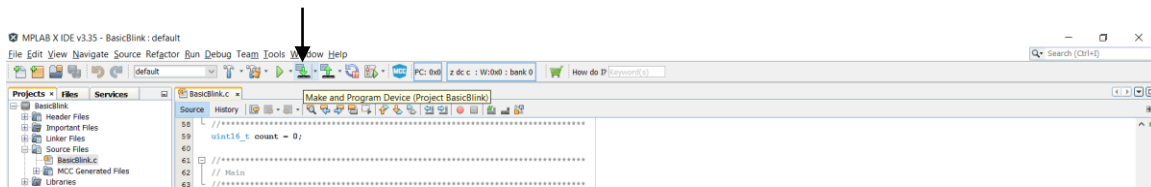
To power your board from the PICkit 3 programmer you will need to set the output voltage and enable the output power. Select **Project Properties** from the **File** drop down menu



Set up the PICkit 3 programmer by selecting:
PICkit 3 under the **Options categories: Select Power**



Set the operating voltage to 5.0 and check the box to power target from PICkit 3. The output window will now display the Device Revision of the connected device when you press the **Make and Program Device** button.



*Programmer to target power is enabled - VDD = 5.000000 volts.
Target device PIC16F18324 found.
Device ID Revision = 2003*

Blinking the LED:

The code available on the SeniorDesignLab.com website will blink an LED using a time wasting loop at a specified rate. Your assignment is to modify the code to blink the LED at a rate that matches the last digit of your RedID. To do this you will need to make minor changes to the code supplied. You can take advantage of the Stop Watch built into MPLAB to tune your code before downloading to the microcontroller. After downloading your modified code to the development board measure the flash rate on an oscilloscope and compare the results.