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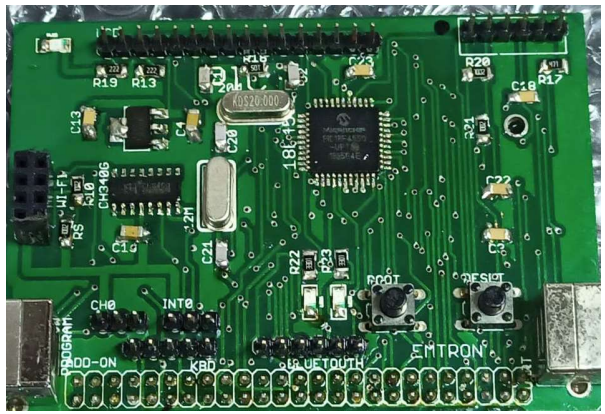


PIC 18F4550 Piggyback Board

HARDWARE LABORATORY MANUAL

Salient Features of PIC18F4550

PICs come with 1 of 4 CPU 'cores':

- 12bit cores with 33 instructions: 12C50x, 16C5x
- 14bit cores with 35 instructions: 12C67x,16Cxxx
- 16bit cores with 58 instructions: 17C4x,17C7xx
- 'Enhanced' 16bit cores with 77 instructions: 18Cxxx

Some common peripherals are:

- Tri-state ("floatable") digital I/O pins
- Analog to Digital Converters (ADC) (8, 10 and 12bit, 50ksps)
- Serial communications: UART (RS-232C), SPI, I^2C, CAN
- Pulse Width Modulation (PWM) (10bit)
- Timers and counters (8 and 16bit)
- Watchdog timers, Brown out detect, LCD drivers

12C508	25 Bytes RAM
16C71C	36 Bytes RAM
16F877	368 Bytes (plus 256 Bytes of nonvolatile EEPROM)
17C766	902 Bytes RAM
18F4550	2048 Bytes RAM

Salient Features of PIC18F4550 Piggyback Board

- This development board is centered on PIC18F4550 M 8-bit RISC microcontrollers from Microchip. This controller has 32K flash and 2K RAM. In-built 10-bit, up to 13-channel Analog-to-Digital Converter, Four Timer modules (Timer0 to Timer3), Three External Interrupts, Four Crystal modes, including High Precision PLL, Supports up to 32 Endpoints (16 bidirectional), Interface for Off-Chip USB Transceiver.
- This module of microcontrollers is extensively used for embedded and real-time applications in industry. This board is designed to be a general-purpose development board for Single Chip MCU applications that may be used as an instructional learning aid and also as a development tool in R&D labs in industries

Board Features:

- PIC18F4550-based board developed (TQFP-44 package)
- USB-powered and programmable Interface
- +3.3v Regulated Power Supply
- Serial Port Interface through UART-USB converter
- a Large number of on-board I/Os
- Connectors are made available for the interfacing of standard I/O such as switches/LEDs and LCD

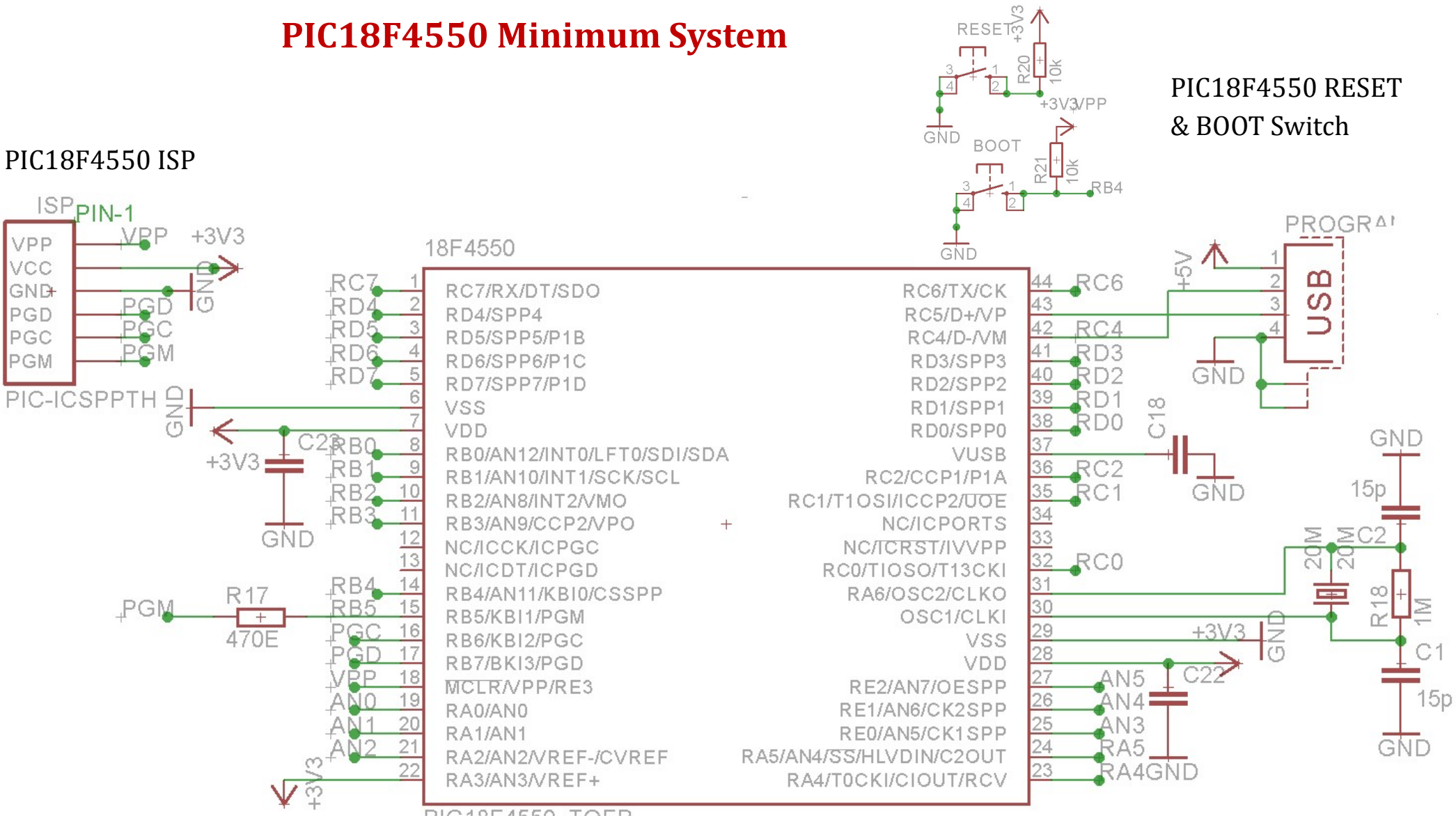
Hardware Operational Guidelines

- Switch OFF the USB Supply when mounting any external connecting wires or Sensors.
- After completion of the wiring, ensure no short circuits and reverse connection of Supply and Ground pins. Any wrongdoing damages the power supply and permanently damages the electronic components.
- Most of the components have a direction. Verify which is the Pin Number one in the case of ICs. In the case of LEDs, and Diodes find out Anode and Cathode terminals. In the case of external sensors, the Supply and ground pins.
- Verify the rating of the components before interfacing i.e., Voltage and Current rating. Any kind of excess loading and reverse polarity may damage the electronic components.
- When you are giving external Voltage to Digital ICs, & Microcontrollers make sure no signal voltage exceeds more than 3.3V (i.e., 0 to 3.3V, no negative signal) and do not draw a current of more than 10 mA from IC pins.
- While writing the programs for LCD, Stepper Motor, DC Motor, Servo Motor, and Relay refer to the Connector details of the manual to know where these signals are available for interfacing purposes.
- When you switch ON the power to the board the LED indicator shows power is OK. Similarly, PIC18F4550 uses the external USB-Micro B type cable for programming and giving power to the CPU, and Sensors.
- If any components are hot or getting a burning smell immediately switch off the Supply and also remove the USB cable.
- In such case disconnect all the external connections you have made and verify once again. If the problem exists, i.e. POWER LED is not getting ON then return the kit to the institute for maintenance purposes.
- **use HID-BootLoader for programming**
- **For Programming Press fist BOOT- then RESET release RESET & then BOOT switches**

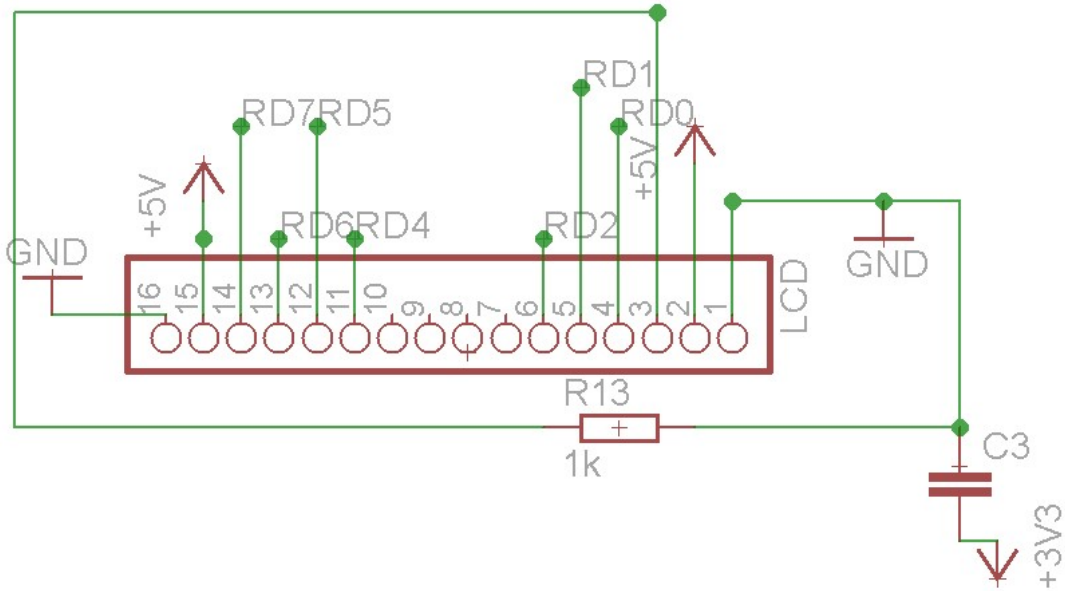
PIC18F4550 Minimum System

PIC18F4550 ISP

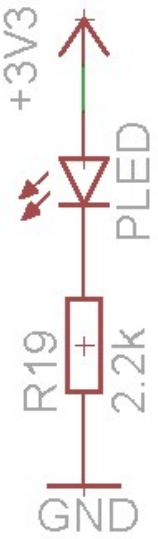
PIC18F4550 RESET & BOOT Switch



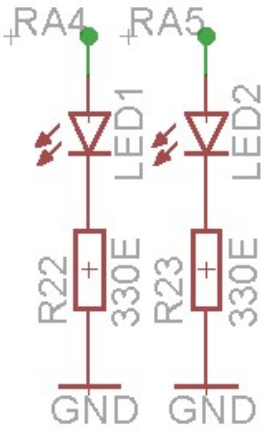
16x2 LCD Interface



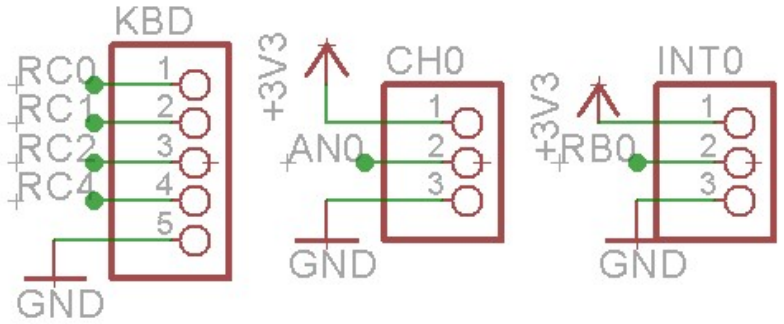
POWER LED



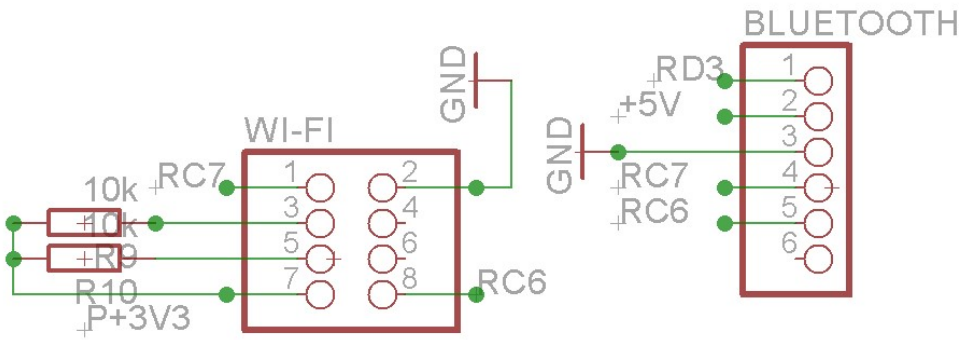
LED Interface

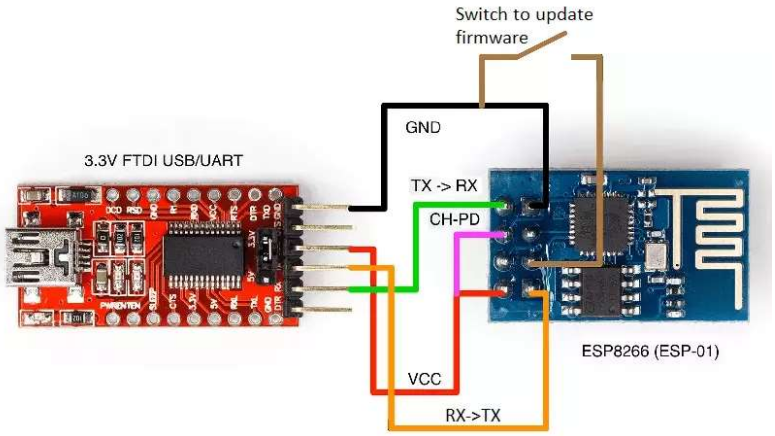


I/O Connector

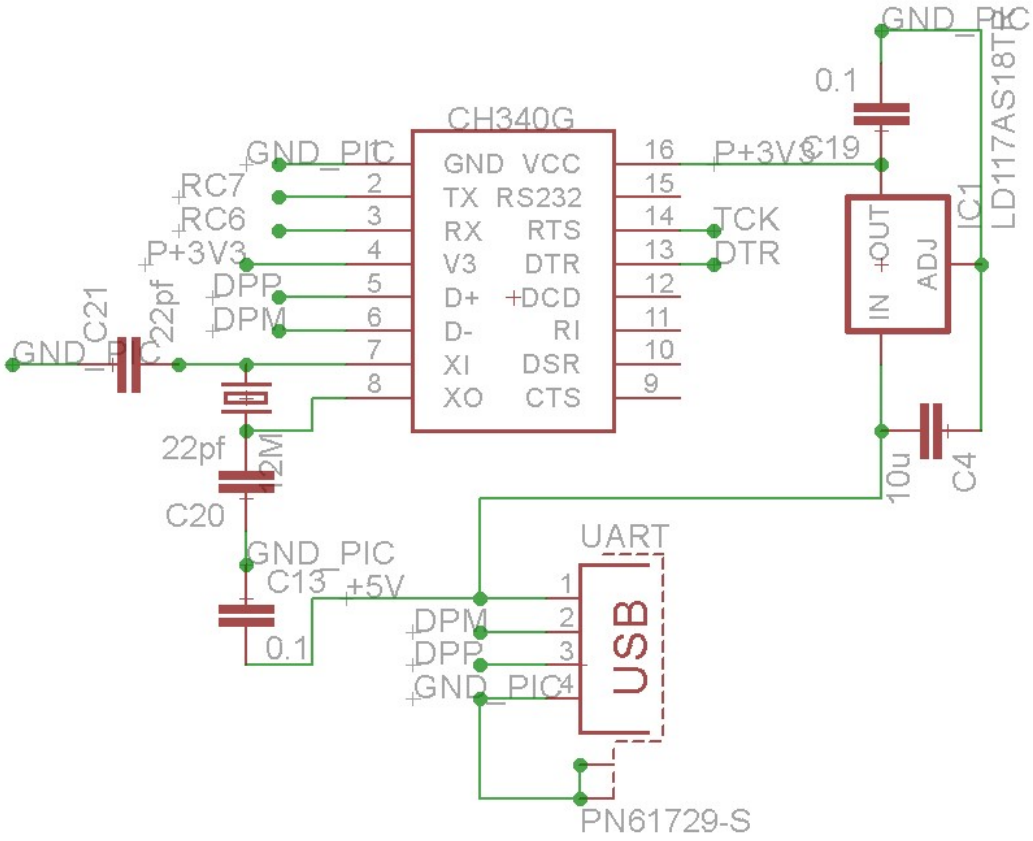


Wi-Fi & Bluetooth Interface

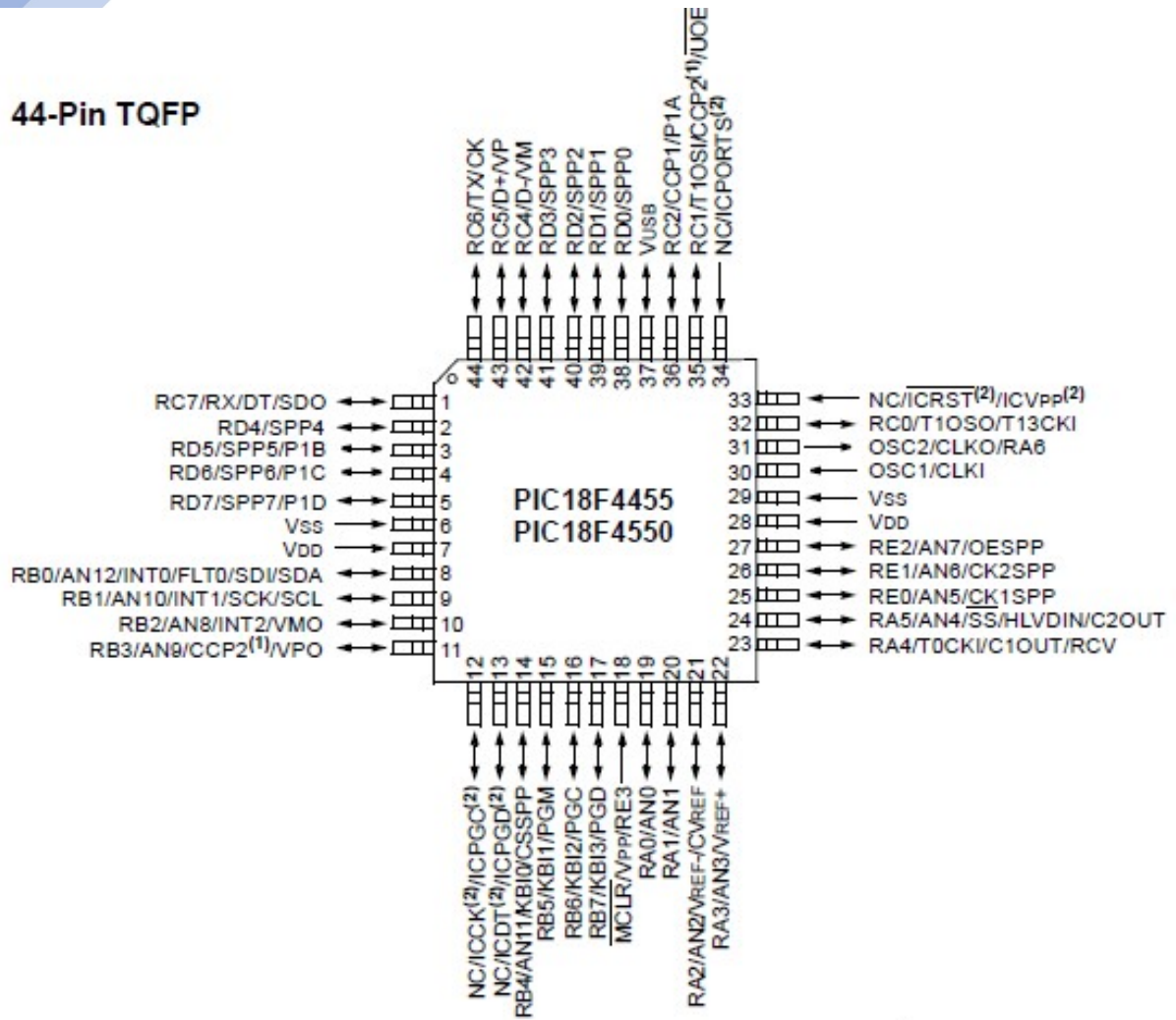


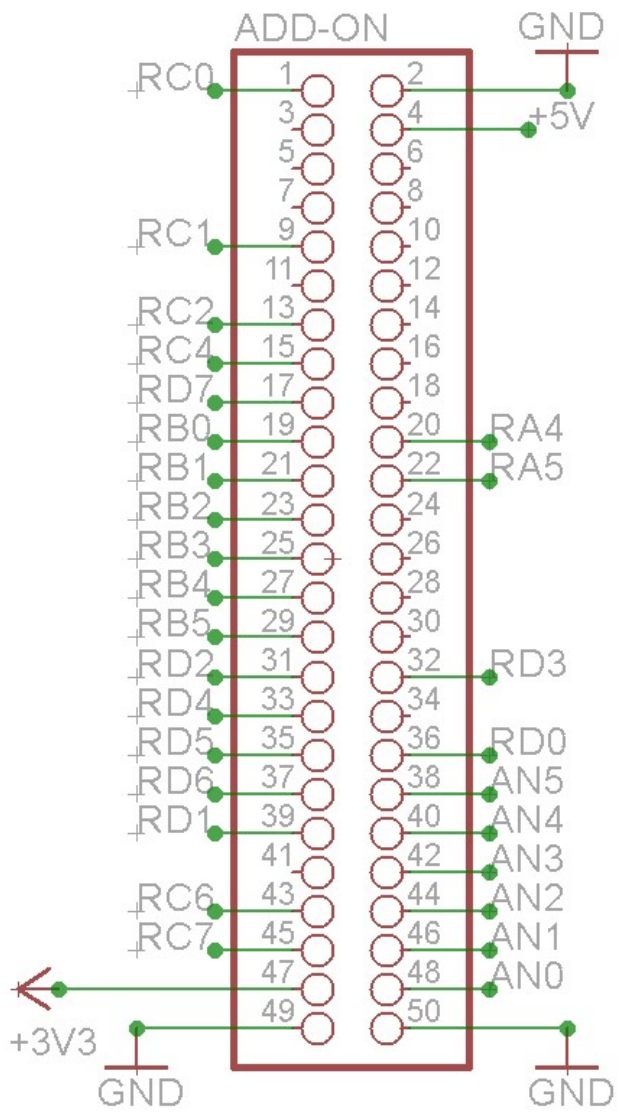


USB-UART Converter



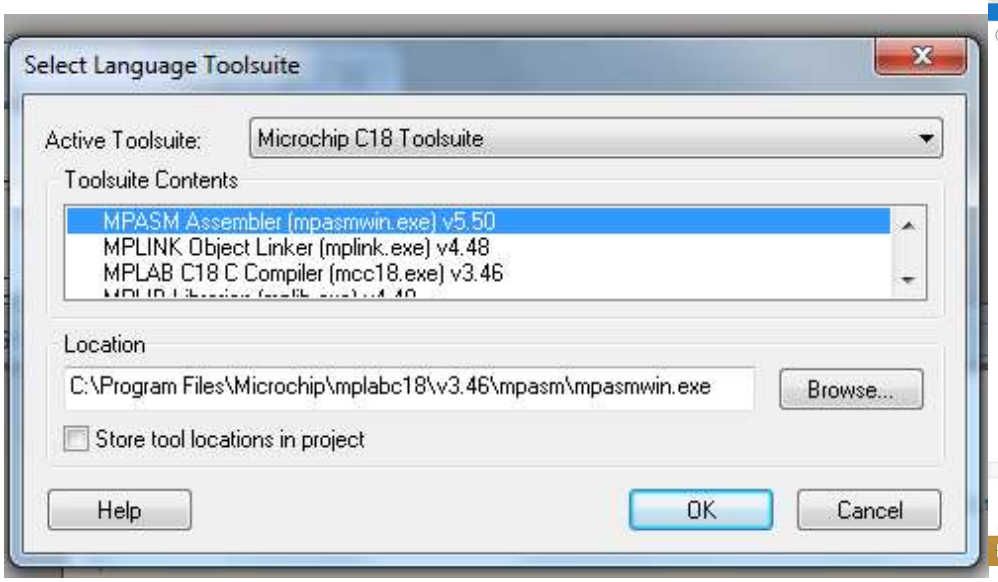
Piggyback Interface Connector

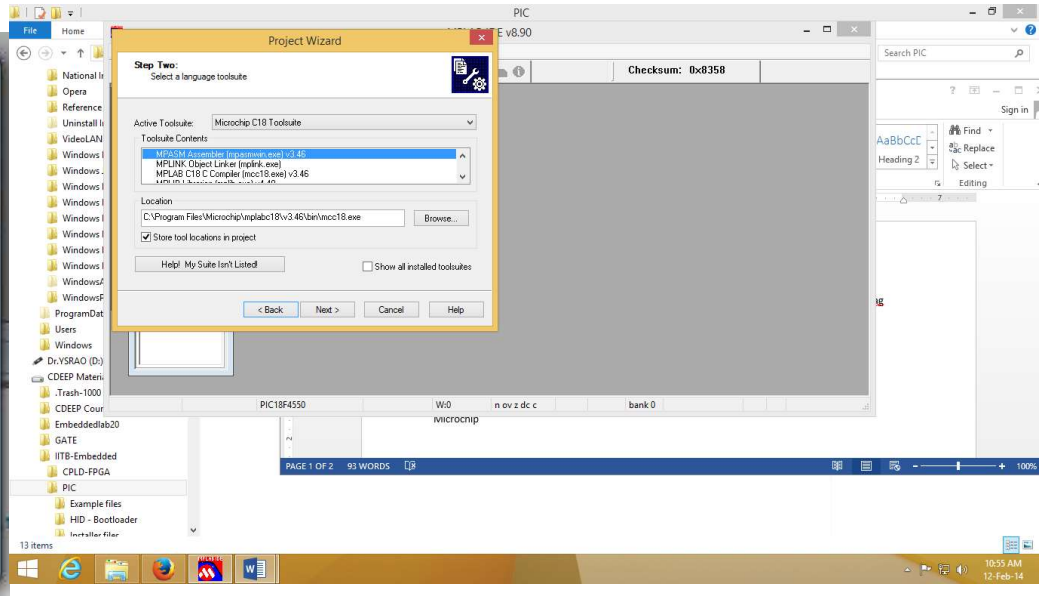




PIC 18F4550 Installation & Programming

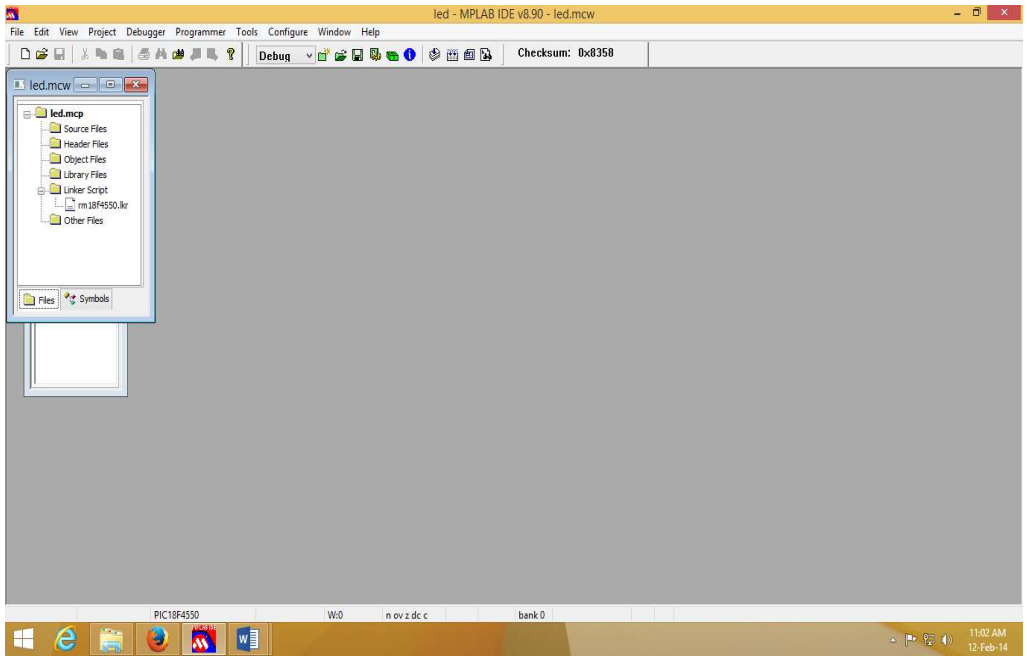
1. Install MPLAB
2. Install c18 compiler (mplabc18-v3.46-windows-lite-installer.exe)
3. Install from the folder NET/ NETCFS Driver
4. Start MPLAB
5. Project->Projectwizard->select device (PIC 18F4550)->select language toolset-> select mpasmwin, mplink,mccc18,mplib provide a path of all four like C:\Program Files\Microchip\mplabc18\v3.46\bin\mcc18.exe
6. Create an example folder
7. add rm184550.lkr file to the project file (use rm184550lkr while compiling the programs to avoid boot loader overwriting

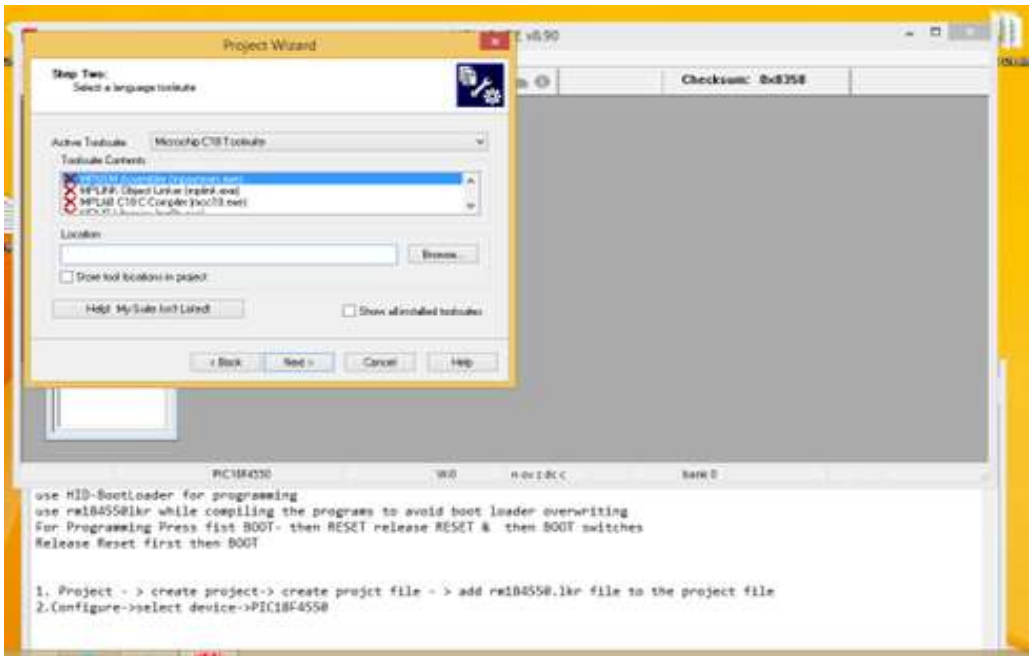




PIC18F4550 Programming HID Bootloader:

1. add source file (.c) ; 2. locate header files: Project -> built options -> project->
a. show directories for -> include search path -> New : C:\Program Files\Microchip\mplabc18\v3.46\h
b. Library search path path -> New : C:\Program Files\Microchip\mplabc18\v3.46\lib
c. Linker search path-> C:\Program Files\Microchip\mplabc18\v3.46\bin\LKR
1. configure -> select device->PIC18F4550
2. Debugger -> select tool-> MPLABSIM (for simulations); 3. Build the file.
1. use HID-BootLoader for programming
2. **For Programming Press fist BOOT- then RESET release RESET & then BOOT switches**
3. Open Hex File -> select .HEX file -> Program/Verify-> Reset Device

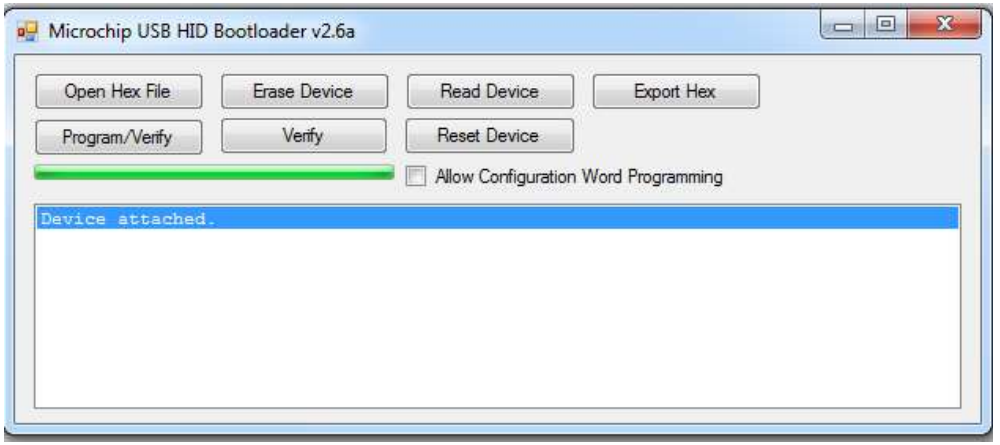




Bootloader is required to make USB enable (programming it using PICKIT3 Programmer through ISP Port)

For Existing Project:

1. to modify the device: Configure-> Select Device->PIC18F4550



PICKIT3: Start MPLAB IDE: Directly load Hex File

1. Programmer-> Select PICKIT3->Debugger-> Connect it
2. File-> import-> LED.Hex file
3. Programmer-> Program

PICKIT3: Start MPLAB IDE : HID bootloader

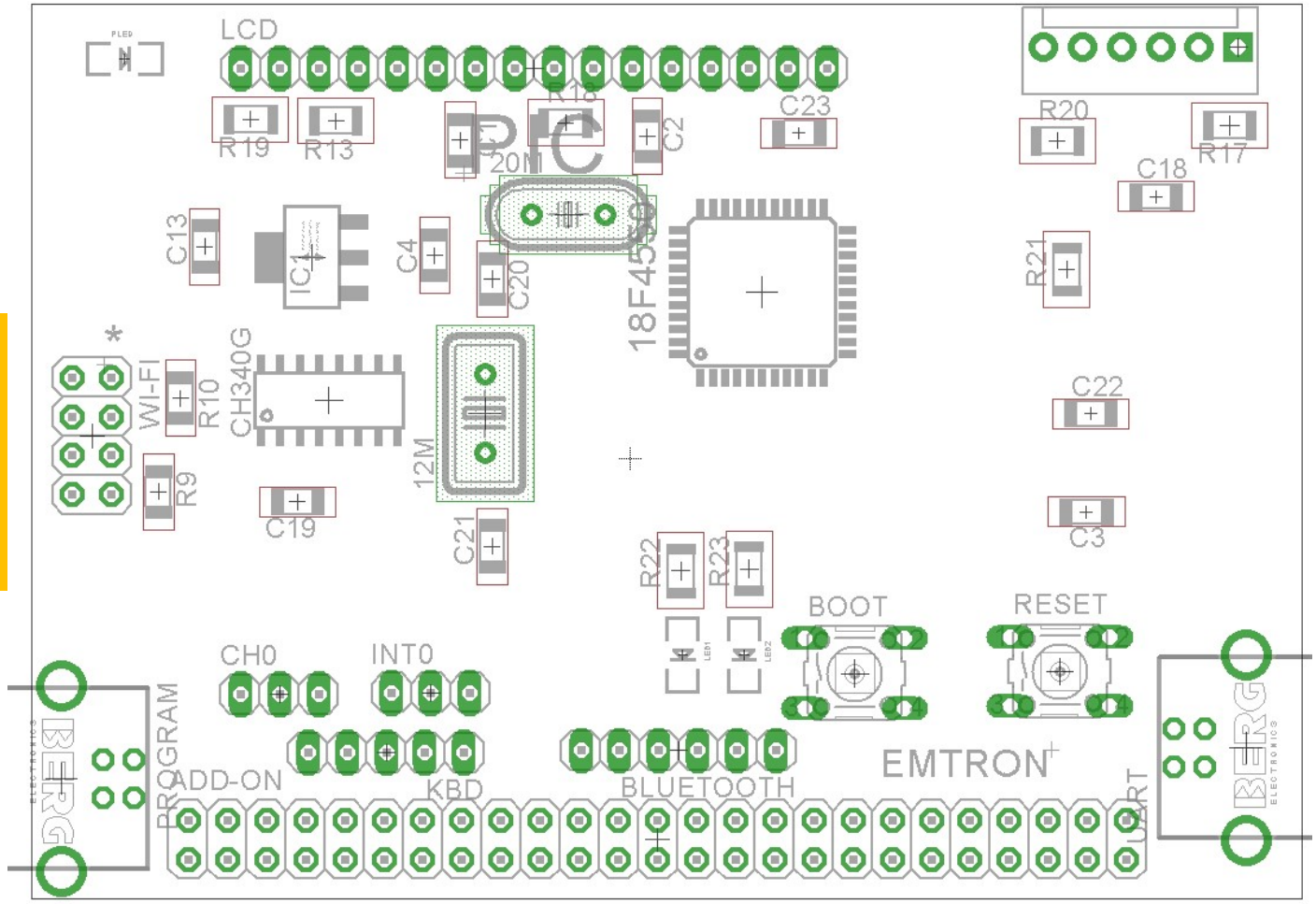
1. Configure -> select device->PIC18F4550
2. Programmer-> Select PICKIT3->Debugger-> Connect it
3. File-> import-> USB Device – HID – HID Bootloader – C18 – PIC18F4550.Hex file
4. Programmer-> Program

To automatically load the Program from Pickit for mass Programming:

Automatic Programmer-> Settings-> Programmer to go -> Send Image in Memory (Select)

For PIC & MPLAB Assembly language Programming videos:
https://www.youtube.com/watch?v=aMK8zkWn7I8&list=PL0F54805E3165D763

Lecture Videos Link: https://www.youtube.com/user/EMTRONTechnologies



COMPONENT PLACEMENT