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ArisePIC V1.1

PIC16F/18F Microcontroller Development Board Lab Manual
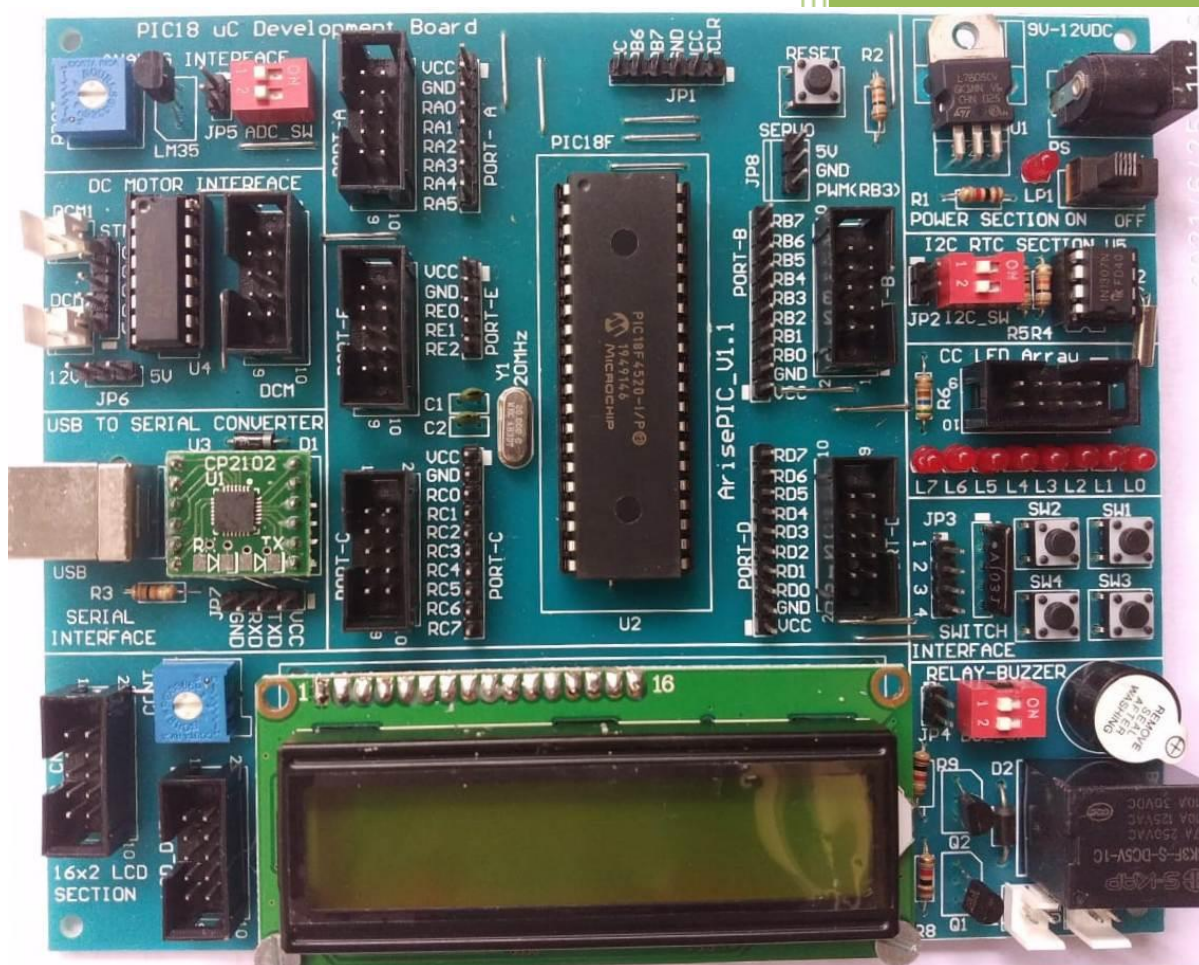
- Development Boards
- PCB Designing
- Electronic Components
- Industrial Training
- Industrial Projects

CONTENT

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email: smartlogitech@gmail.com, Mobile: 7745024542

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Chapter 1: Introduction

We are very much thankful to you for procuring PIC16F/18F Microcontroller Development Board - "**ArisePIC V1.1**". We have introduced an innovative design to support PIC16F and PIC18F family microcontrollers.

One of the innovative features of development board is, all the port pins are open so that user can interface the peripherals very easily to any one of the port pins.
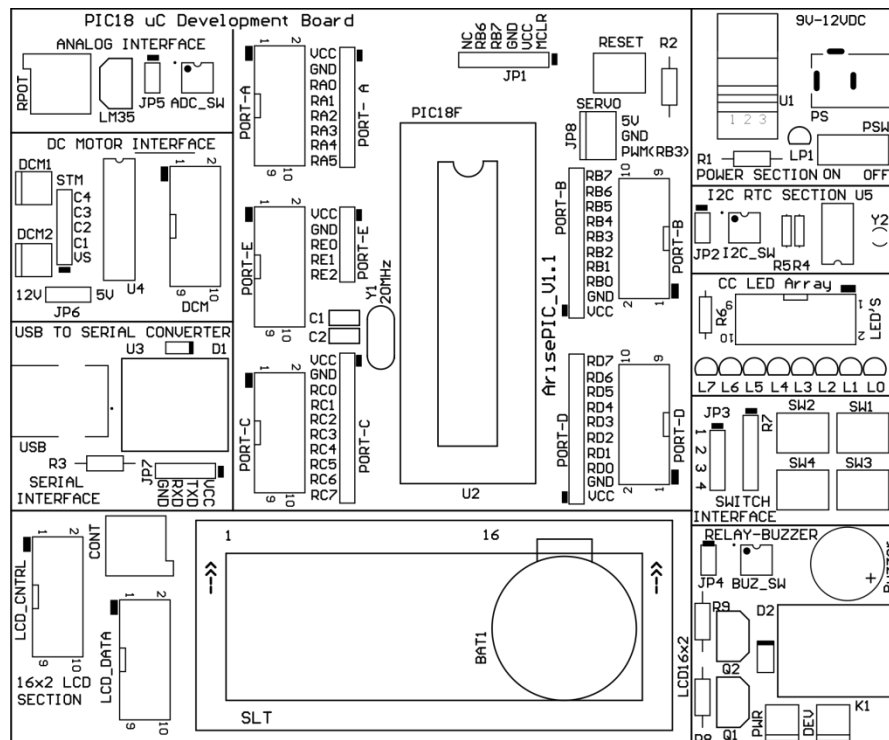
A. Board Features

- Supports various microcontrollers
    - PIC18F4520
    - PIC18F4550
    - PIC18F458
    - PIC16F877
- In-system programming facility
- USB Programmable (Serial Boot loader)
- USB to Serial Converter
- 8-User Programmable LEDs
- 4 Pushbuttons / Interrupt buttons
- 16 x 2 LCD Interface
- I2C based RTC (DS1307)
- Analog input interface – LM35 and Trim pot
- Relay and Buzzer Interface
- DC Motor Driver (L293D) Interface
- USB Powered
- All ports open for peripheral connections
- User selectable port pins for peripheral interface

B. Kit Contents (Deliverables)

- Development Board
- USB Cable (A to B)
- 10 FRC Cable
- Pin to Pin Connectors
- 12VDC / 9VDC, 1A Adapter
- Board Manual
- Sample Programs

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C. Board Layout

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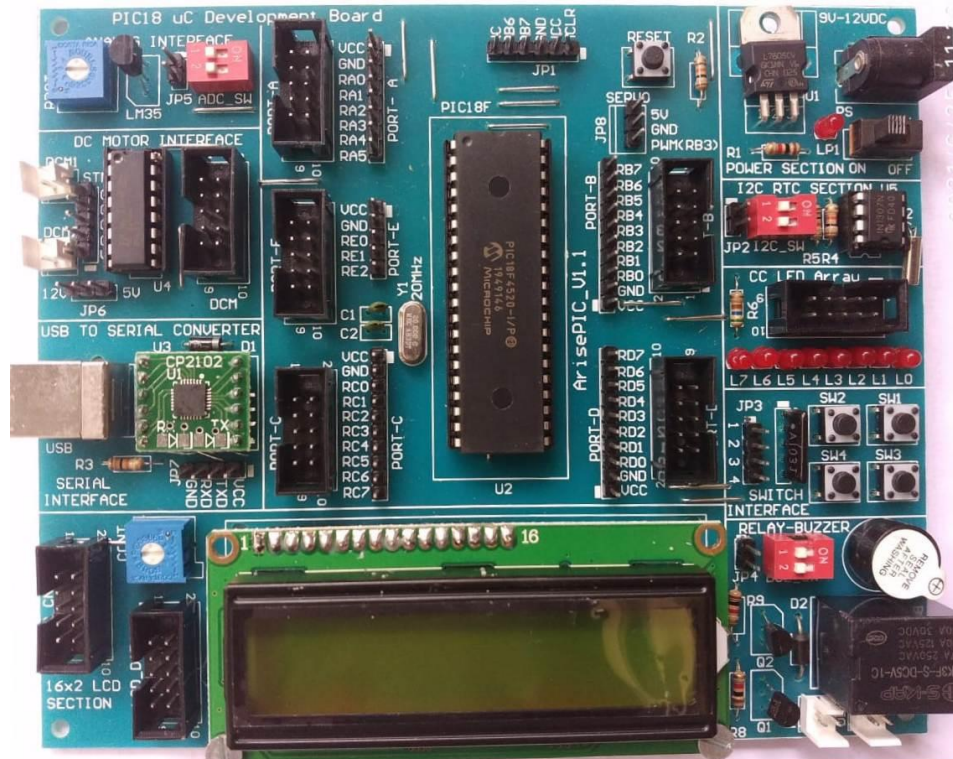
Chapter 2: System Requirements

2.1 Hardware requirements

- PIC microcontroller Development Board (ArisePIC V1.1)

- USB Cable (To program and power the board)

- Power Adapter (optional)

- FRC Cables for connecting peripherals

- Pin to Pin Connectors for connecting peripherals

- Personal Computer (PC) or Laptop with software installed which are mentioned in section 2.2.

2.2 Software Requirements

- Operating System : Windows XP / 7 / 8 / 10

- IDE   : MPLAB v8.85 and above / MPLABX V5 and above

- Compiler   : C18 Compiler or XC8 Compiler

- Utility   :
    o Tiny Multibootloader for programming
    o CP2102 Drivers for USB to Serial Converter

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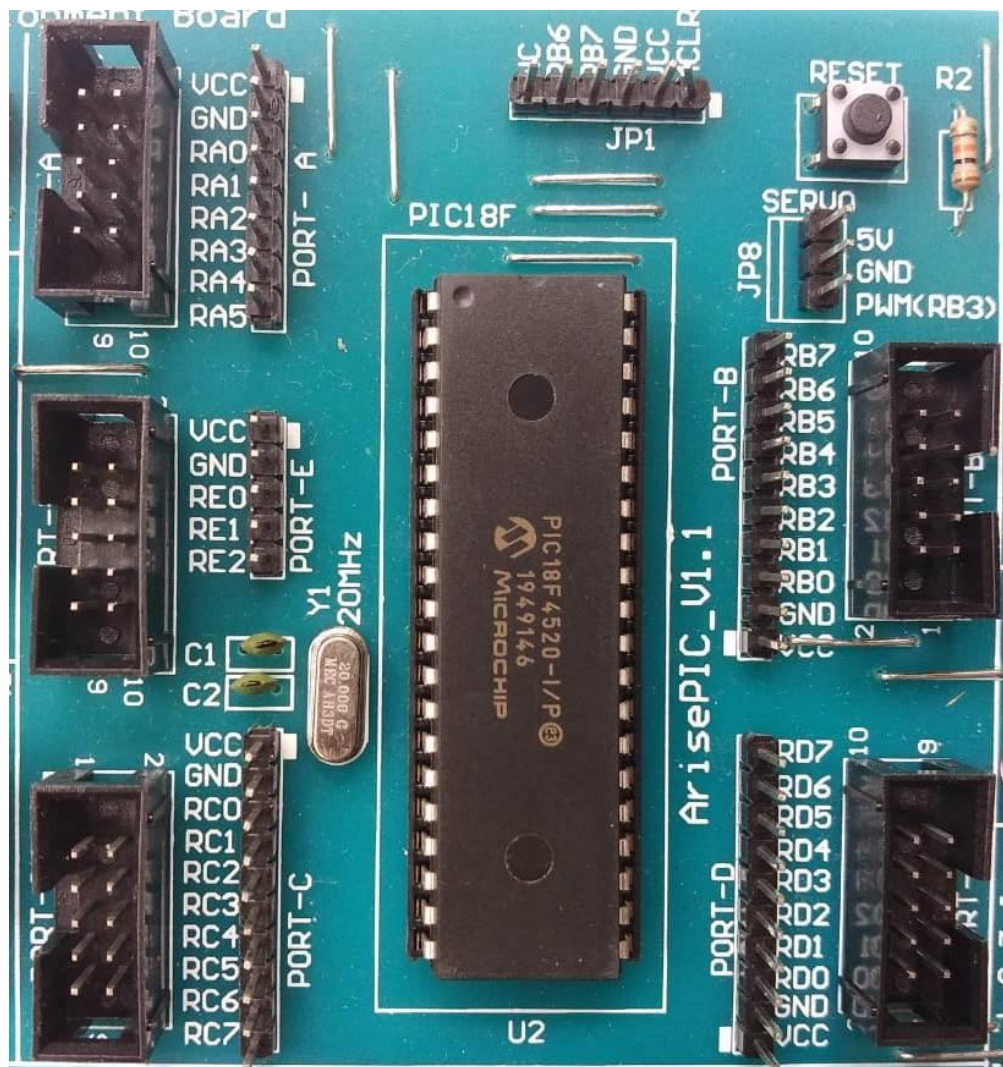email: smartlogitech@gmail.com, Mobile: 7745024542

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Chapter 3: On-board peripherals and Connection Details

1. Microcontroller Section

This section consists on minimum circuit of PIC microcontroller i.e clock circuit, reset circuit, ICSP Connector and Port Pins. All Ports pin available on 10 FRC and Berg strip connector as shown below. JP1 connector is used for programming the microcontroller using ICSP i.e. PICKIT3 Programmer. But in this case we don't need the PICKIT3 programmer since programming can be done using Serial Boot loader. Therefore we are using USB to Serial converter for downloading the Hex File into microcontroller.

Reset button is used to reset the microcontroller. Clock circuit consists of 20MHz crystal. Therefore while calculation of baud rate, timer delay the FSOC is taken as 20MHz only.

This section also consists of three pin connector (JP8) for interfacing the servomotor with microcontroller.

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The connector details of the microcontroller section are as below.

PORT - A Connection	
FRC Pin No.	**Pin Function**
1	VCC
2	GND
3	RA0
4	RA1
5	RA2
6	RA3
7	RA4
8	RA5
9	--
10	--

PORT - B	
FRC Pin No.	**Pin Function**
1	VCC
2	GND
3	RB0
4	RB1
5	RB2
6	RB3
7	RB4
8	RB5
9	RB6
10	RB7

PORT - C Connection	
FRC Pin No.	**Pin Function**
1	VCC
2	GND
3	RC0
4	RC1
5	RC2
6	RC3
7	RC4
8	RC5
9	RC6
10	RC7

PORT-D	
FRC Pin No.	**Pin Function**
1	VCC
2	GND
3	RD0
4	RD1
5	RD2
6	RD3
7	RD4
8	RD5
9	RD6
10	RD7

CC Mode LED's Connection	
FRC Pin No.	**Pin Function**
1	VCC
2	GND
3	RE0
4	RE1
5	RE2
FRC Pin No. 6 – 10 not used	

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2. Power Section

The board can powered using 9-12V DC adapter or from USB.
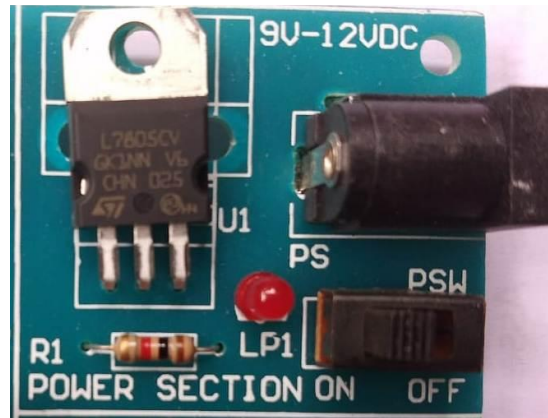
3. Push Button Section

This section consists of 4 push buttons which can be used for providing digital input to microcontroller or act as interrupt source. The push buttons are connected in pull up mode. It gives outputs logic high '1' when switch is not pressed. Whenever switch is pressed, it gives output logic low '0'. User can use Pin to Pin connector to interface the push button to any of the port pin.

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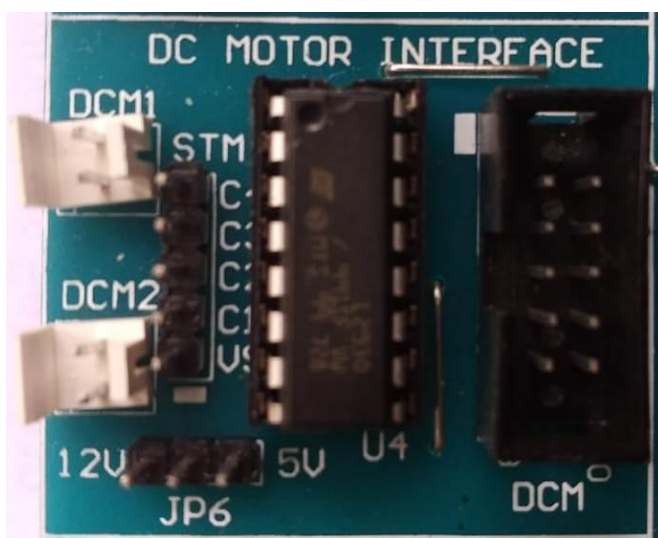email: smartlogitech@gmail.com, Mobile: 7745024542

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4. I2C Section

This section consists of **I2C RTC – DS1307**. The 2-way DIP switch is used to interface I2C devices to I2C port pin of microcontroller. When DIP switch is in ON position; I2C devices connected to specified port pin of microcontroller otherwise user can connect to any other port pin of microcontroller by putting DIP switch in OFF position.

I2C_SW	JP2	Signal	PIC18F4520	PIC18F458	PIC18F4550
1 - ON	1	SDA	RC4 (SDA)	RC4 (SDA)	Connect using Pin to Pin Connector
2 - ON	2	SCL	RC3 (SCL)	RC3 (SCL)	

5. DC Motor Section

This section consists of Driver IC L293D which is used to either drive stepper motor or DC Motor. The section can power with 5V or 12V as per the requirement using jumper **JP6**. The connection details of FRC connector is as shown below.

DC Motor Connection	
FRC Pin No.	Pin Function
1	VCC
2	GND
3	IN1
4	IN2
5	EN1
6	EN2
7	IN3
8	IN4
9	--
10	--

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6. LED Section

This section consists of 8 LED's for digital output. LED's are connected in Common Cathode Mode. The LED's can be interface to any pin/ pins of microcontroller using pin to pin connector or 10-FRC Connector.

CC Mode LED's Connection	
FRC Pin No.	**Pin Function**
1	NC
2	GND
3	LED0 (L0)
4	LED1 (L1)
5	LED2 (L2)
6	LED3 (L3)
7	LED4 (L4)
8	LED5 (L5)
9	LED6 (L6)
10	LED7 (L7)

7. Relay and Buzzer Section

This section consists of buzzer for audio indication, relay to control the appliances. The 2-Way DIP switch is used to interface these inputs to Microcontroller Pins. When DIP switch is in ON position; peripherals connected to specified port pin of microcontroller otherwise user can connect to any other port pin of microcontroller by putting DIP switch in OFF position.

BUZ_SW	JP4	Signal	PIC18FXXX
1 - ON	1	Relay	RB2
2 - ON	2	Buzzer	RB3

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8. LCD Section

This section consists for 16x2 LCD interfacing provision. There are two 10 pin FRC Connector; one is for LCD Control Signal and other one is for LCD Data Signal.

LCD_CNTRL FRC 10-pin Connector	
FRC Pin No.	Pin Function
1	VCC
2	GND
3	LCD_RS
4	LCD_RW
5	LCD_EN
6	--
7	--
8	--
9	--
10	--

LCD_DATA FRC 10-pin Connector	
FRC Pin No.	Pin Function
1	VCC
2	GND
3	LCD_D0
4	LCD_D1
5	LCD_D2
6	LCD_D3
7	LCD_D4
8	LCD_D5
9	LCD_D6
10	LCD_D7

9. Analog Input Interface Section

This section consists of 2 Analog inputs. One is Variable resistor 'POT' and other is Temperature Sensor LM35. The DIP switch is used to interface these analog inputs to Analog Pins of Microcontroller. When DIP switch is open then Analog Inputs will be connected Specified Analog Pins otherwise user can connect to any other analog input pin.

ADC_SW	JP6	Signal	PIC18FXXXX
1 - ON	1	POT	RA0
2 - ON	2	LM35	RA1

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10.USB to UART Section

This section consists of CP2102 - USB to UART converter. By default this connected to UART0 of microcontroller.

Signal	PIC18FXXXX
TXD	RC6 (TX)
RXD	RC7 (TX)

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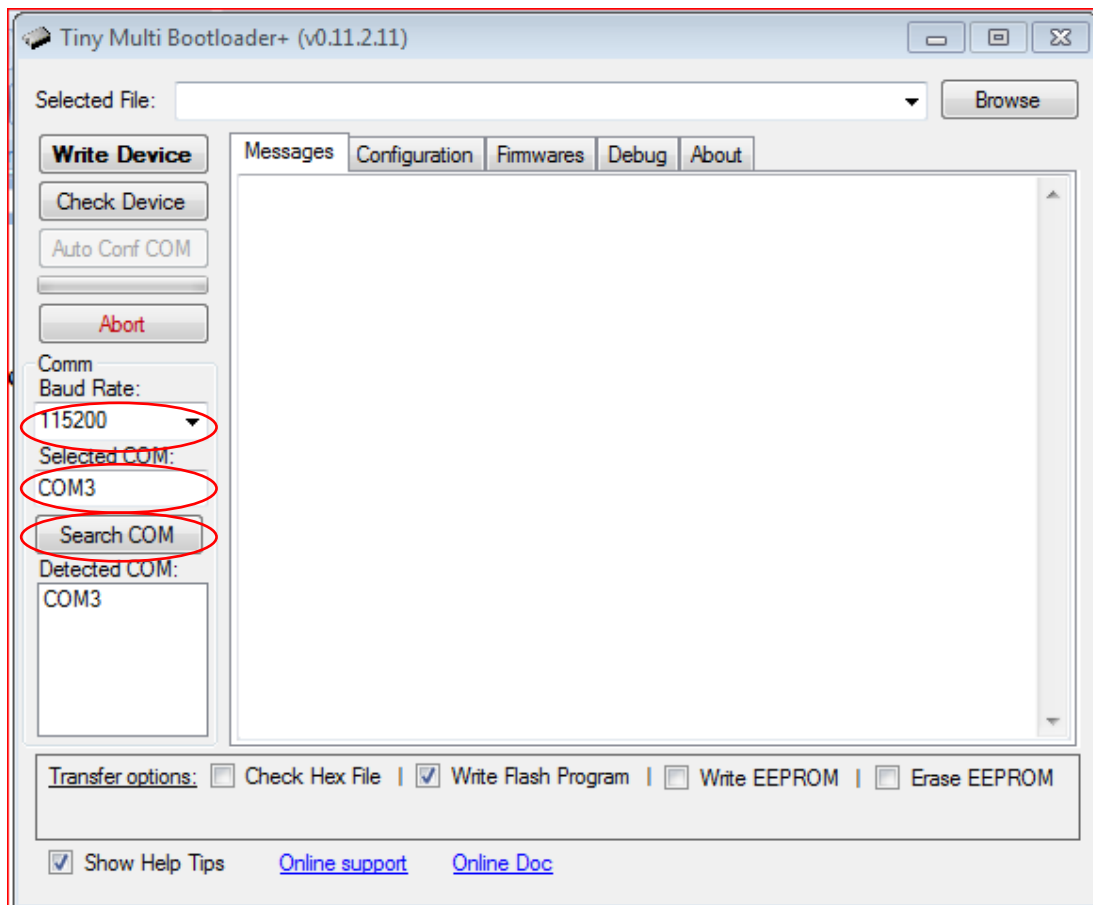email: smartlogitech@gmail.com, Mobile: 7745024542

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Chapter 4: Programming Steps

Generally PICKIT3 or ICD programmer is used to download the hex file into PIC microcontrollers. This is needs to purchase the PICKIT3 or ICD Programmer with additional cost.

The ArisePIC v1.1 is preloaded with Serial Boot loader firmware. This allows the user to program the microcontroller without using separate programmer. Only we need is Programming Utility – Tiny Multibootloader for downloading the hex file.
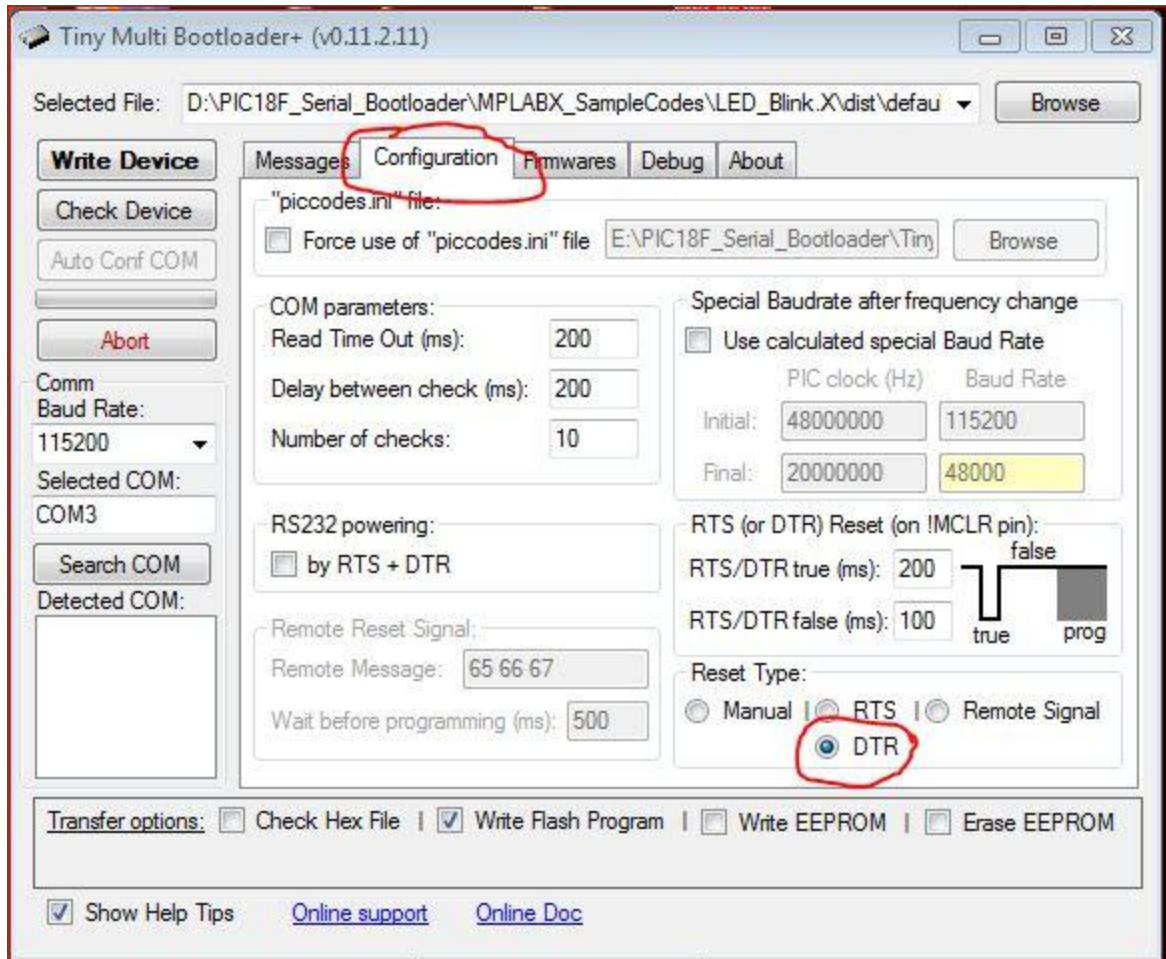
- **Using of Tiny Multibootloader**
  a. Connect the Power supply and keep the board in **switched ON mode**.
  b. Connect the USB port of trainer kit to a PC using USB Cable.
  c. Open Tiny Multibootloader utility.
  d. Click on search COM port for detecting the COM port of development board
  e. Select COM Port of Development Board (User Can check the COM Port by navigating Device Manager on Computer)
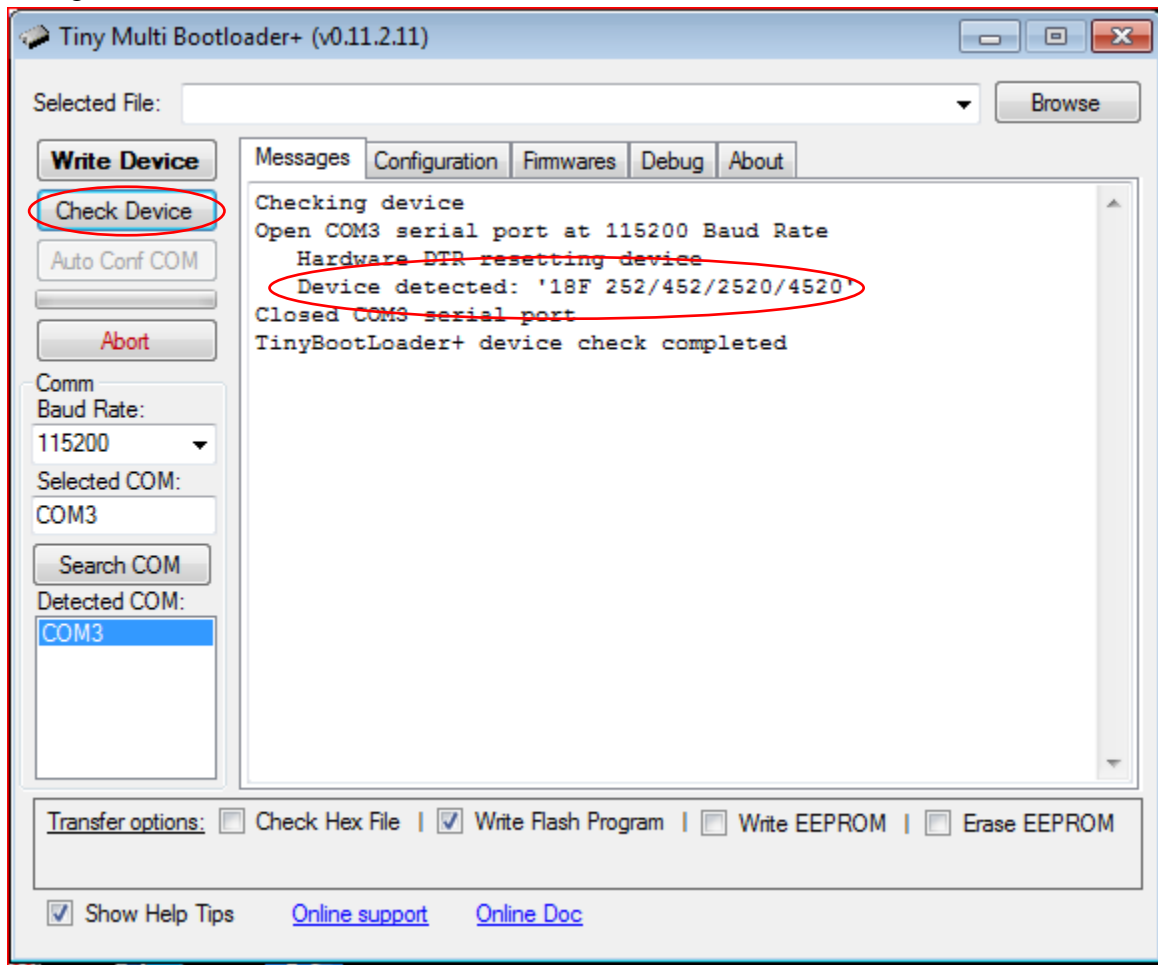 f. Select the Baud Rate 115200 for serial communication

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g. Go to configuration and make sure that reset type is DTR.

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h. Click on check device to check the communication of Tiny Multibootlodaer with Development Board.
i. Once the communication established, it shows the microcontroller family as shown in figure below.

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j. Browse the .Hex file to be downloaded into PIC microcontroller.

k. Click on write device button to download

l. Automatically starts downloading and shows **Upload was successful** in messages window. (Refer the figure). If downloading will not start automatically, press the RESET button while Boot loader searches for PIC.
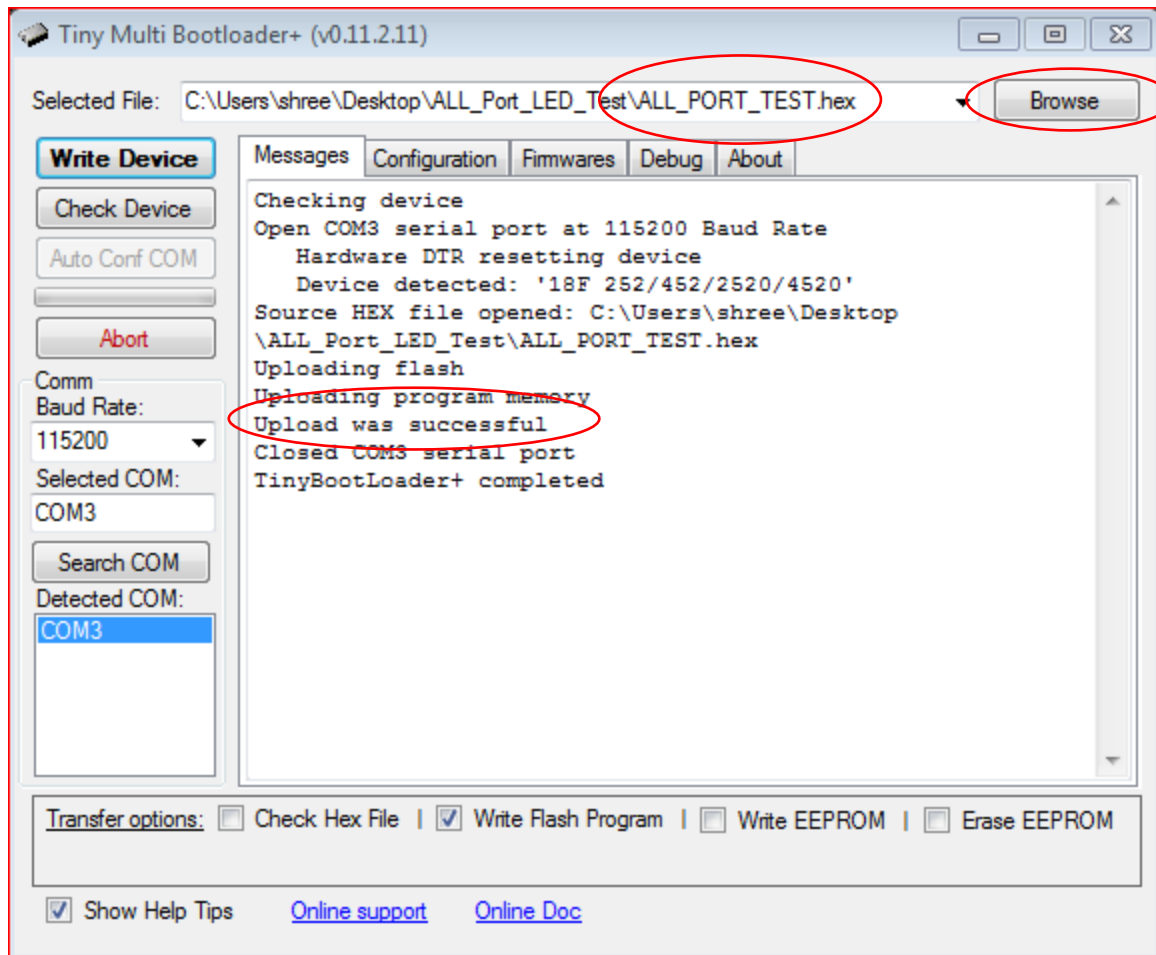
Note: *The microcontroller is preloaded with boot-loader software. Programming with other Device s/ programmers or removing the microcontroller from the development board could damage the boot-loader. In this case, the company won't be liable for the damages caused and no replacement/refunding/reloading is entertained.*

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