

ĐẠI HỌC QUỐC GIA TP.HỒ CHÍ MINH  
TRƯỜNG ĐẠI HỌC BÁCH KHOA  
KHOA ĐIỆN-ĐIỆN TỬ  
BỘ MÔN KỸ THUẬT ĐIỆN TỬ



## Embedded System Design

A Basic Tutorial for MPLAB IDE

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## References

- Materials
  - Microchip, “MPLAB IDE User’s Guide”, Elsevier Newnes, 2009
- Websites
  - <http://www.microchip.com>



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## PIC KIT

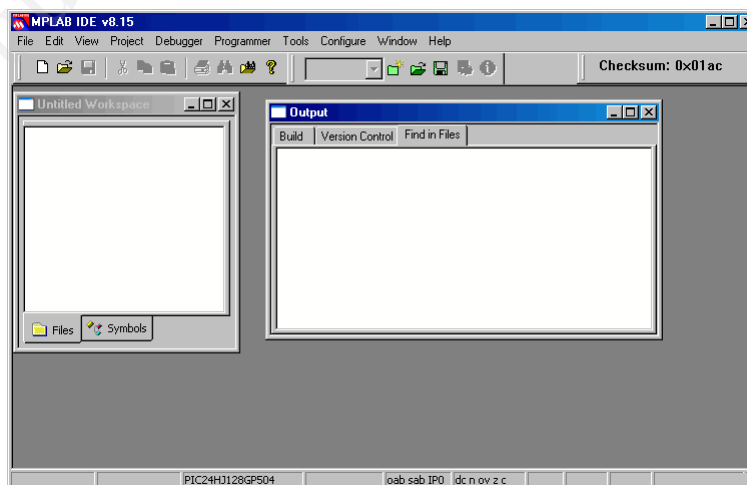


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## MPLAB

- MPLAB® IDE DESKTOP



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## How to use

All projects will have these basic steps:

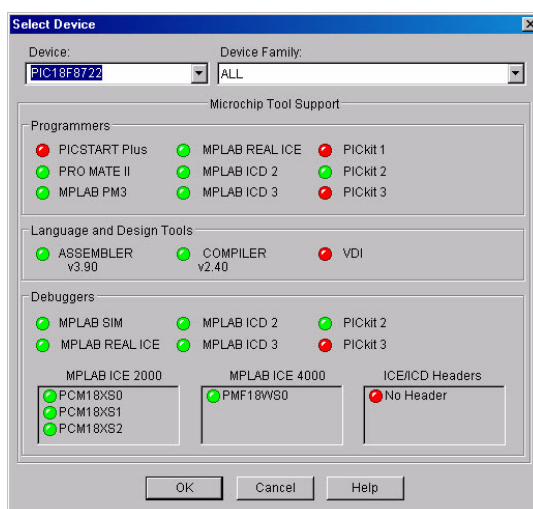
1. Select Device – Chọn thiết bị
2. Create Project – Tạo dự án
3. Select Language Tools – Chọn ngôn ngữ
4. Put Files in Project – Đặt file vào dự án
5. Create Code – Tạo mã chương trình
6. Build Project – Xây dựng dự án
7. Test Code with Simulator – Kiểm tra mã với phần mềm mô phỏng

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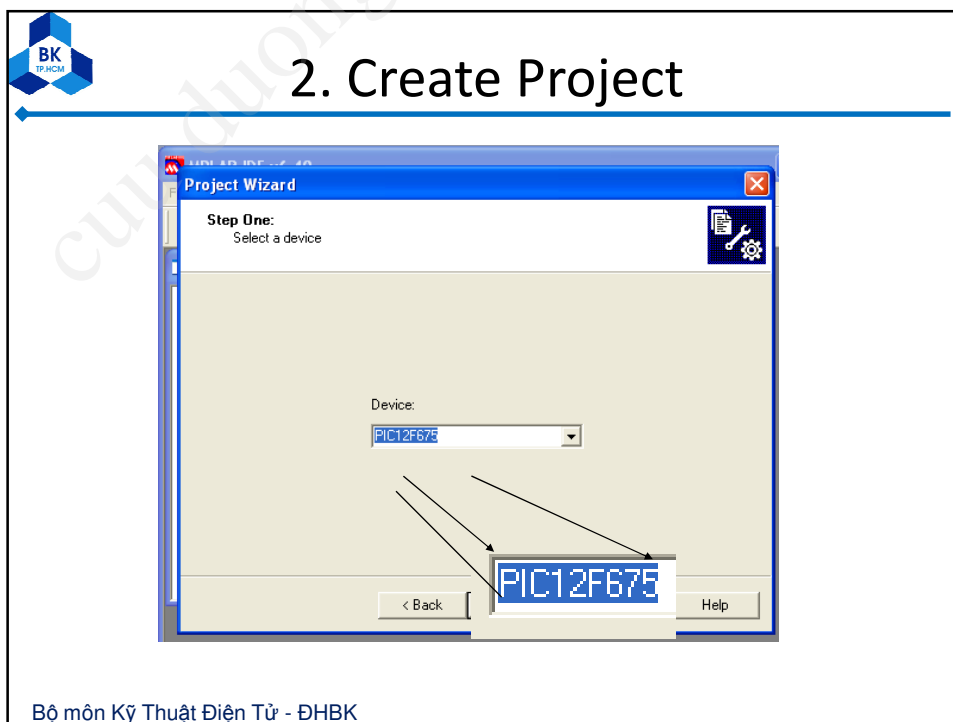
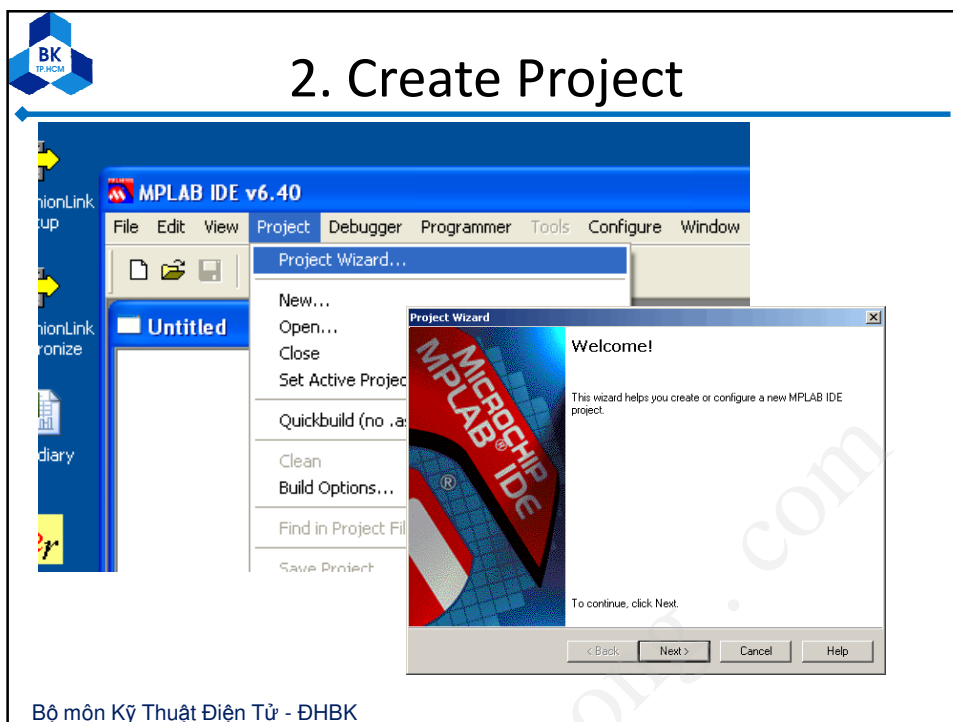
## 1. Select Device

- Choose *Configure>Select Device*.



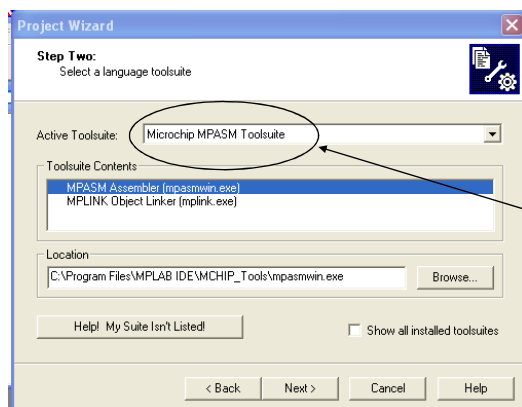
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### 3. Select Language Tools

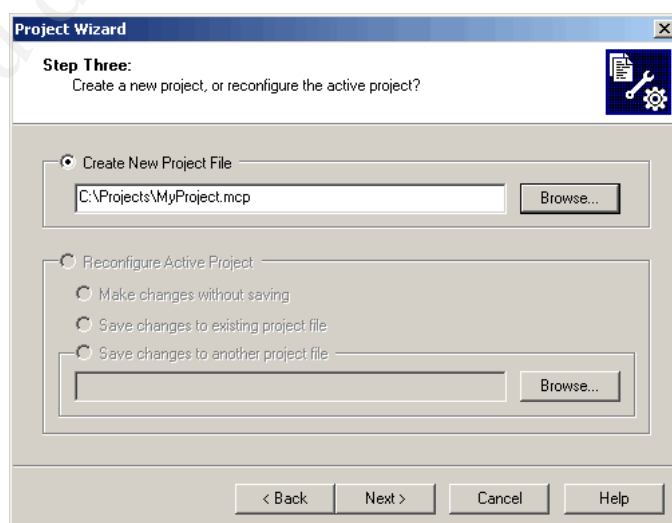


you should select  
the assembler tools  
(We do not provide basic)

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### Name your project

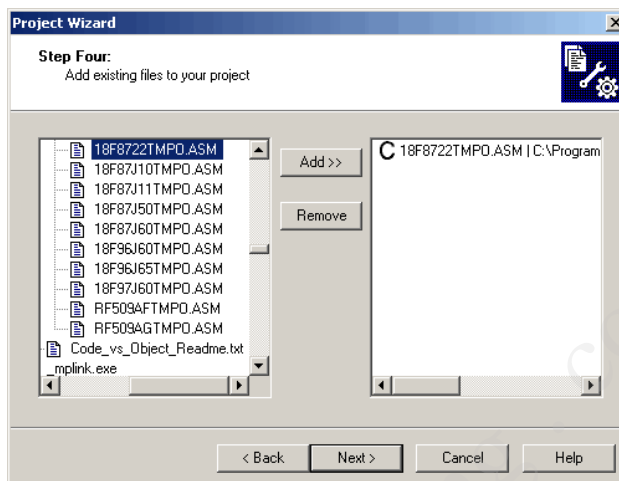


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## 4. Put Files in Project

The template files are simple files that can be used to start a project

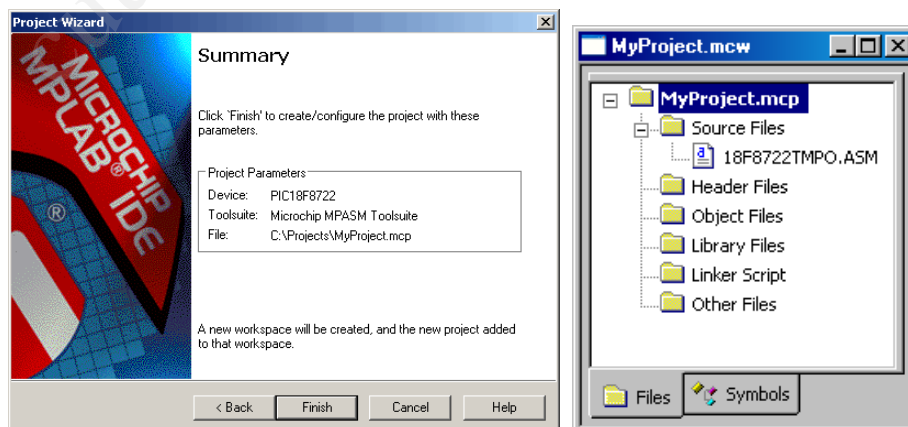


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## Project wizard - Summary

- After pressing the **Finish** button, review the **Project Window** on the **MPLAB IDE** desktop

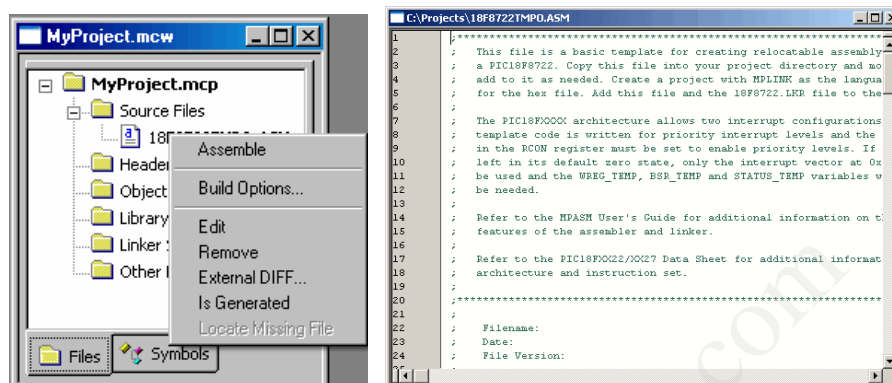


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## 5. Create Code

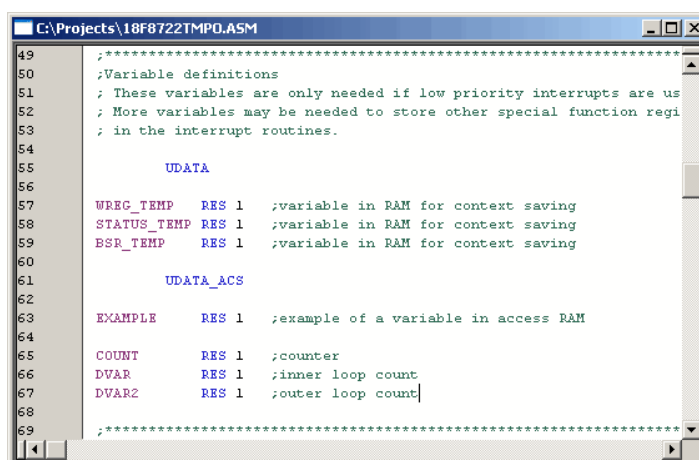


Project context menu (right mouse click)

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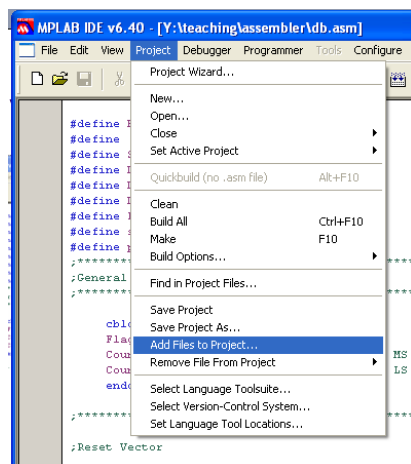
## 5. Create Code – Add variables



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## Add to project

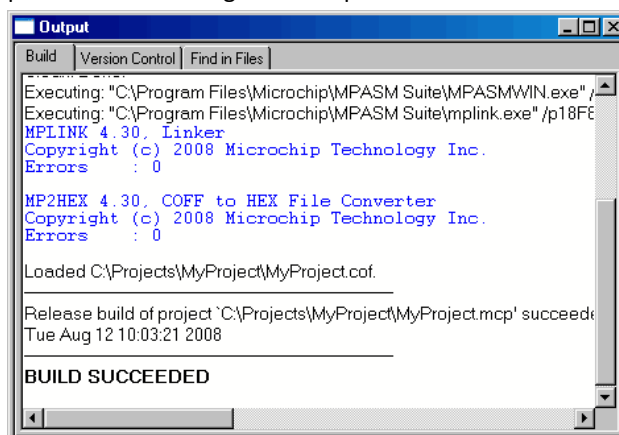


- Once the file is saved you can add it to your project



## 6. Build Project

- Project>Build All*
- Select *Project>Build Options>Project* and click on the **MPASM Assembler tab**.
- Select "Output" from the "Categories" drop-down list.

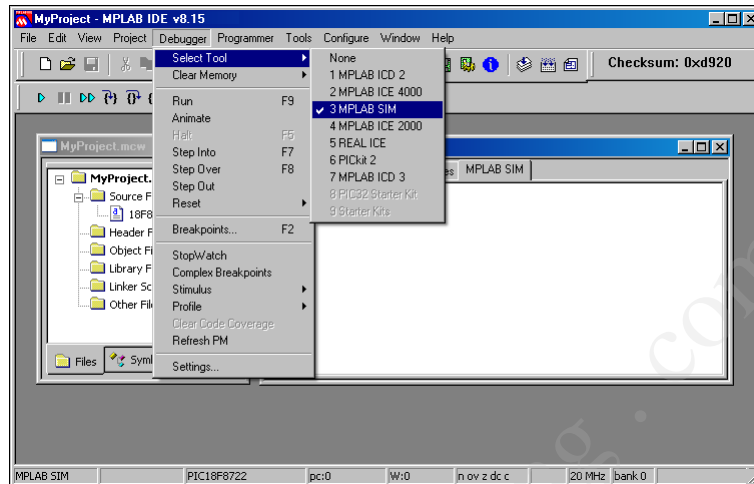






## 7. Test Code with Simulator

- *Debugger>Select Tool*



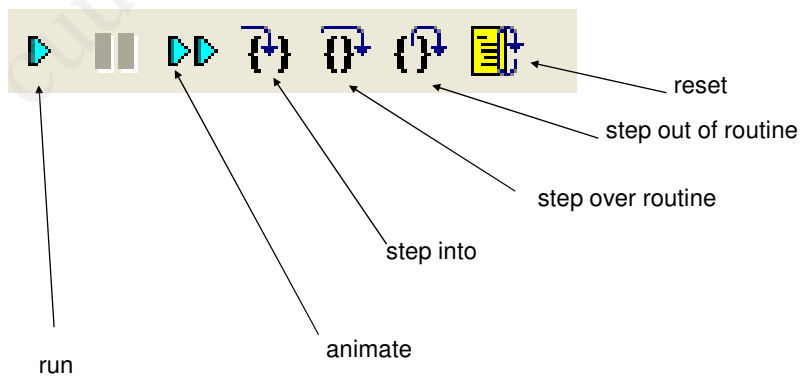
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## 7. Test Code with Simulator

Simulator toolbar



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## 7. Test Code with Simulator

- Select *Debugger>Reset>Processor Reset*

```

70 ;EEPROM data
71 ; Data to be programmed into the Data EEPROM is defined here
72
73 DATA_EEPROM CODE    0xf00000
74
75     DE "Test Data",0,1,2,3,4,5
76
77 ;*****
78 ;Reset vector
79 ; This code will start executing when a reset occurs.
80
81 RESET_VECTOR    CODE    0x0000
82
83     goto    Main    ;go to start of main code
84
85 ;*****
86 ;High priority interrupt vector
87 ; This code will start executing when a high priority interrupt occurs
88 ; when any interrupt occurs if interrupt priorities are not enabled
89
90 HI_INT_VECTOR    CODE    0x0008
91
92     bra    HighInt    ;go to high priority interrupt routine
93
94

```

Code after processor reset

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## 7. Test Code with Simulator

- Select *Debugger>Step Into to single step to the code at Main.*

```

126 ; *** low priority interrupt code goes here ***
127
128
129     movff    BSR_TEMP,BSR    ;restore BSR register
130     movff    WREG_TEMP,WREG    ;restore working register
131     movff    STATUS_TEMP,STATUS    ;restore STATUS register
132     retfie
133
134 ;*****
135 ;Start of main program
136 ; The main program code is placed here.
137
138 Main:
139     clrwf    WREG    ; clear PORTC
140     movwf    PORTC    ; clear PORTC
141     movwf    TRISC    ; configure PORTC as all outputs
142
143 Init
144     clrwf    COUNT,A    ; initialize counter
145 IncCount
146     incf     COUNT,F,A    ; increase count and
147     movwf    COUNT,W,A    ; display on PORTC
148     movwf    PORTC
149
150

```

Code after step into

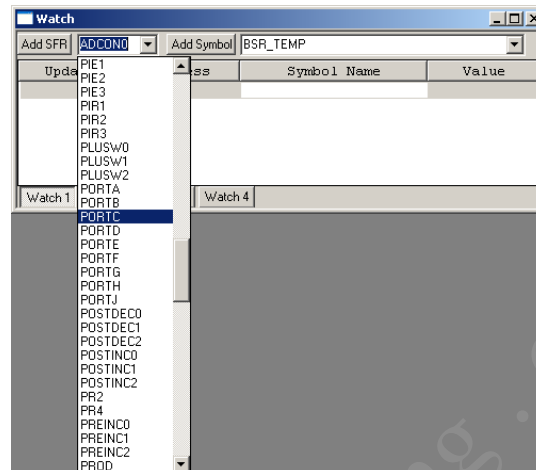
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## 7. Test Code with Simulator

- Select *View>Watch* to bring up an empty Watch window.

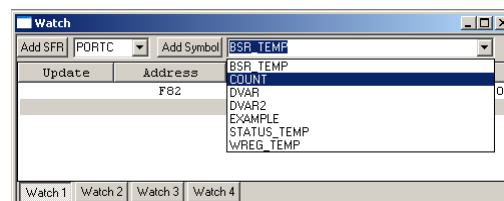


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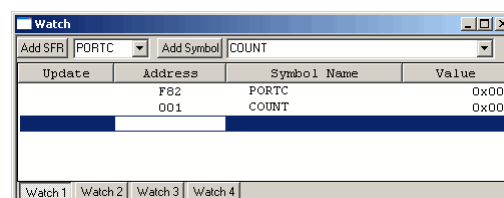
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## 7. Test Code with Simulator



Watch – select variable “count”



Watch – reset values

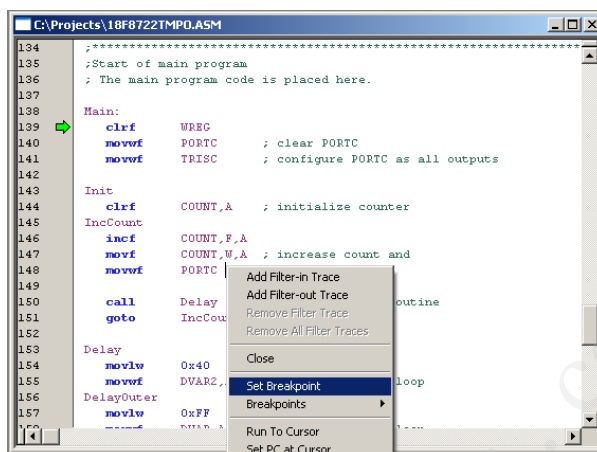
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## 7. Test Code with Simulator

- To set a breakpoint, put the cursor on the line and click the right mouse button



Debug context menu (right mouse click on line)



## Debug and Emulator



MPLAB REAL ICE In-Circuit Emulator System



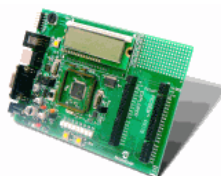
MPLAB PICKit 3 for debugging and programming



PICKit™ 2 Debug Express and the PICKit 2 Starter Kit



PIC18F4XK20 Starter Kit



PICDEM PIC18F8722



Starter Kit PIC18F46J50