UIC00A
USB ICSP PIC PROGRAMMER
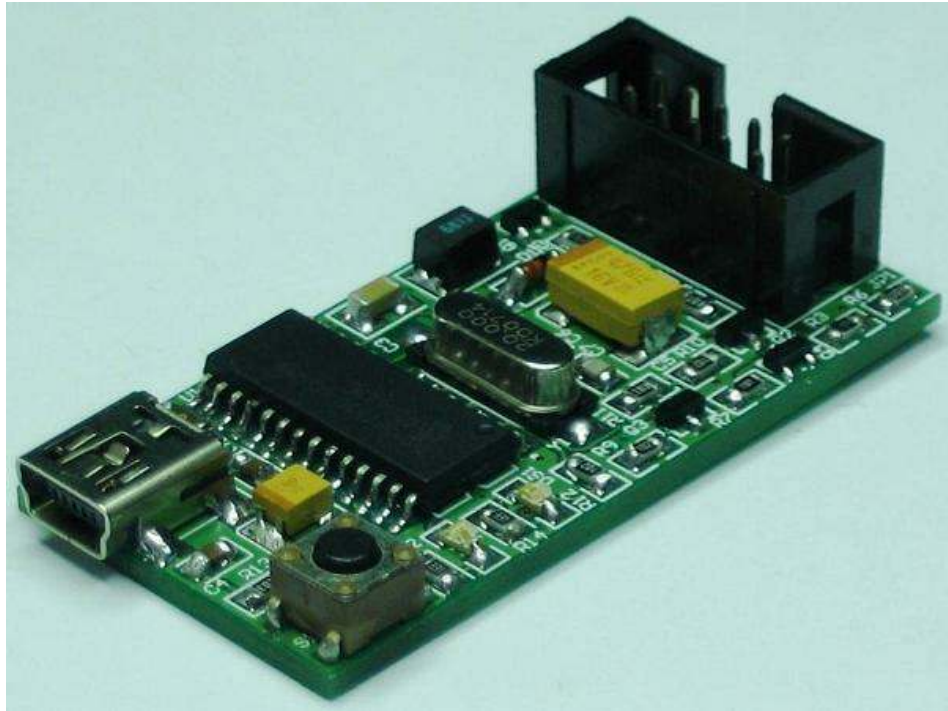
User's Manual

V1.6

Feb 2008

Index

1. INTRODUCTION AND OVERVIEW

UIC00A offers low cost yet reliable and user friendly PIC USB programmer solutions for developer, hobbyist and students. It is designed to program popular Flash PIC MCU which includes PIC12F, PIC16F and PIC18F family. It can also program 16bit PIC MCU. On board ICSP^{TM} (In Circuit Serial Programming) connector offers flexible method to load program. It supports on board programming which eliminate the frustration of plug-in and plug-out PIC MCU. This also allow user to quickly program and debug the source code while the target PIC is on the development board. Since USB port have become a popular and widely used on Laptop and Desktop PC, UIC00A is designed to be plug and play with USB connection. This programmer obtained it power directly from USB connection, thus **NO external power supply** is required, making it a truly portable programmer. This programmer is ideal for field and general usage. UIC00A offers reliable, high speed programming and free windows interface software.

It is designed with capabilities and features of:
- Industrial grade PCB with surface mount component to offer small size yet reliable and quality product.
- Every component is soldered properly and programmer is tested before it is shipped to customer.
- USB Plug and Play function.
- IDC box header for ICSP^{TM} connection, an IDC cable is included for external on board programming.
- Windows XP compatible software.
- **Compatible with Windows Vista***.
- Auto load program capability.
- Compatible with Microchip's PICkit 2.
- **Optional external power to target PIC should be +5V**.
- Small size of **5cm x 2.5cm**.
- Powered directly from USB port.
- **NO EXTERNAL POWER REQUIRED for UIC00A to function**.
- USB 2.0
- Low cost yet reliable solution.
- Suitable for Laptop and Desktop PC.
- Optional socket (UIC-S) to program 18 pins, 28 pins and 40 pins PIC microcontroller (except for dsPIC).

*UIC00A has been tested on several editions of Windows Vista. If user found it is not compatible, we will offer money back guarantee (need to be shipped back within 3 days from receiving date, shipping is not included).

This document explains the method to use UIC00A.

2. PACKAGING LIST

Please check the parts and components according to the packing list. If there are any parts missing, please contact us at sales@cytron.com.my immediately.
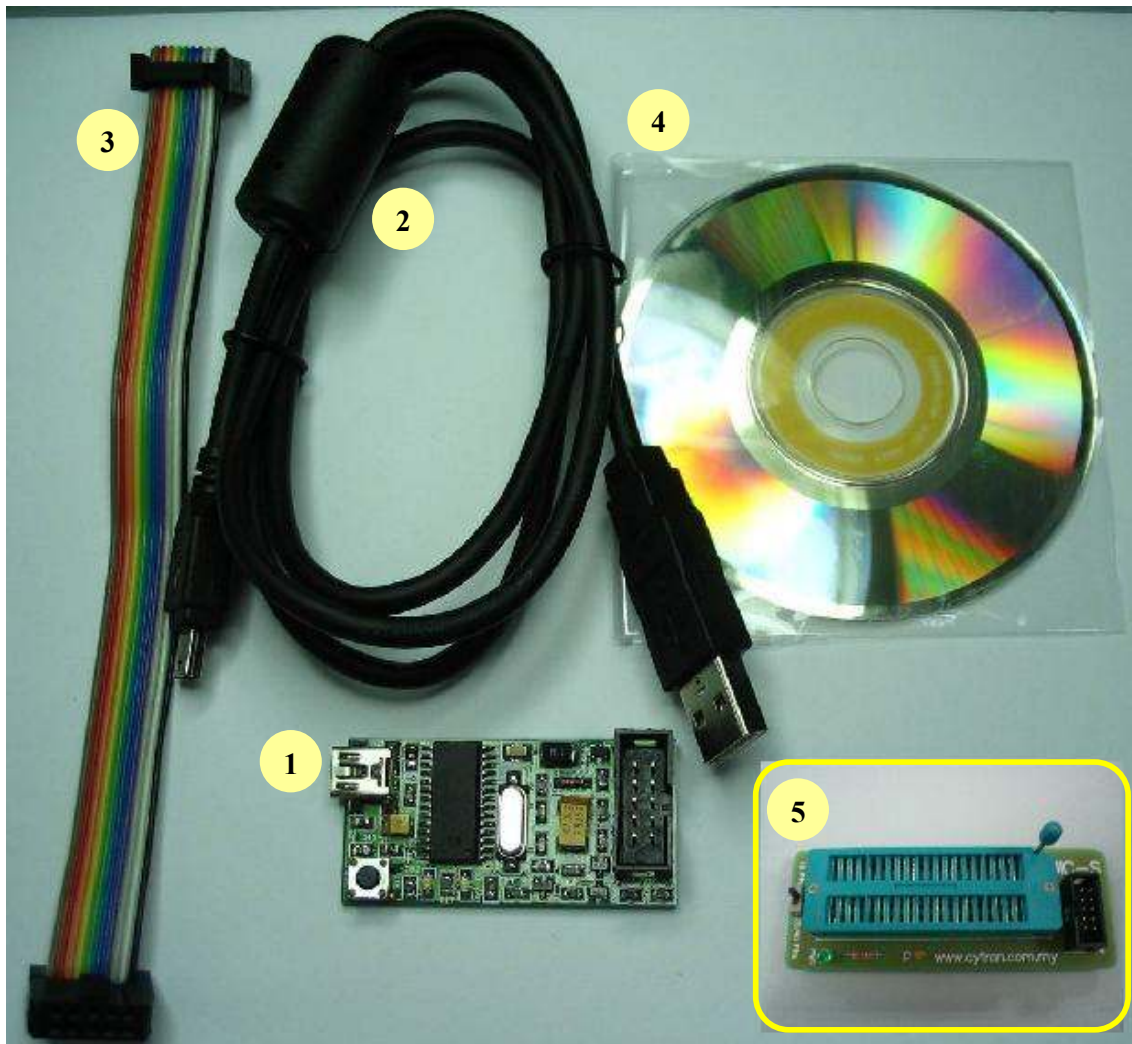
1. 1 x UIC00A main board
2. 1 x mini USB cable
3. 1 x rainbow cable (programming cable)
4. 1 x Software Installation and User's Manual CD
5. 1 x UIC-S socket board (optional, buy separately from Cytron website)

3. SUPPORTED PIC

UIC00A is compatible with PICkit 2 programmer software. It has been tested to load program using UIC-S socket board. Below are the PIC models that being tested using UIC00A:

Mid range devices	18F devices	dsPIC devices *
PIC16F777	PIC18LF4539	dsPIC30F4011
PIC16F877	PIC18F4320	dsPIC30F4013
PIC16F76	PIC18F2320	dsPIC30F1010
PIC16F74	PIC18F448	dsPIC30F4012
PIC16F747	PIC18F4331	dsPIC30F3013
PIC16F886	PIC18F2420	dsPIC30F2012
PIC16F916	PIC18F2320	dsPIC30F3012
PIC16F737	PIC18F2523	dsPIC30F3011
PIC16F73	PIC18LF2550	dsPIC30F3010
PIC16F767	PIC18F2682	dsPIC30F2010
PIC16F627A	PIC18F1330	dsPIC30F2020
PIC16F873A	PIC18F4220	
PIC16F627	PIC18LF4520	
PIC16F84A	PIC18F2423	*** UIC-S cannot be used for**
PIC16LF84A	PIC18F252	**dsPIC devices**
PIC16F84A	PIC18LF252	
PIC16f506	PIC18F4420	
PIC16F616	PIC18F458	
PIC16F627	PIC18F2610	
PIC16F627A	PIC18F2520	
PIC16F628	PIC18F2550	
PIC16F628A	PIC18F4455	
PIC16F716	PIC18F258	
PIC16F737	PIC18F4680	
PIC16F818	PIC18F248	
PIC16LF876A	PIC18F2550	
PIC16F877A	PIC18F2455	
PIC16LF877A	PIC18F2410	
PIC16F877	PIC18F2685	
PIC16F886	PIC18F2680	
PIC16F917	PIC18F2450	
	PIC18F2525	
	PIC18F2431	
	PIC18F2685	
	PIC18F2620	
	PIC18F2221	
	PIC18F1220	
	PIC18F1230	
	PIC18F1320	
	PIC18F452	
	PIC18F2525	
	PIC18F4620	
	PIC18LF4539	

Test condition:
- Using UIC-S socket board (except for dsPIC).
- V_{CC} (+5V) direct from USB port.
- PIC Microcontroller: Stand alone mode.

Note: For those PIC models not listed in the table (but supported in PICkit 2 list) are **not fully tested** by Cytron Technologies with UIC00A. User is advised to ensure its compatibility.

4. BOARD LAYOUT
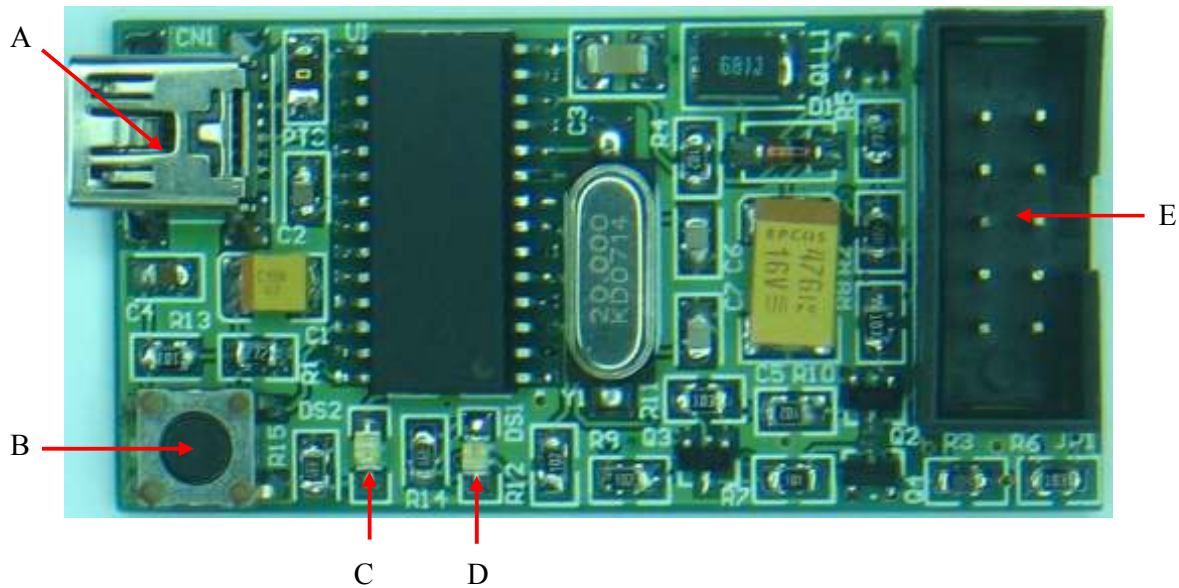
Label	Function	Label	Function
A	Mini USB port socket	**D**	Busy indicator LED (red)
B	Switch to initiate write device programming	**E**	IDC Box Header for programming connector
C	Main power supply indicator LED (green)		

Mini USB port socket at "A" is for USB connection to PC desktop or laptop. Please connect the mini header of USB cable to this socket.

Switch at "B" is a push button which may be used to initiate the write device function when *programmer>Write on PICkit Button* is checked.

Green LED at "C" is used to indicate the main power supply of UIC00A. It should ON once USB connection from UIC00A to computer or laptop is ready.

Red LED at "D" is used to indicate busy function such as UIC00A is in program mode or is alerting that a function is in progress.

IDC box header at "E" is for programming cable. Please connect one end of programming cable to this header, while the other end to target board. Please refer to section 7.2.1 for details pin configuration of IDC box header.

5. INSTALLATION (HARDWARE)

This section will show the connection during UIC00A usage.

### 5.1   Using UIC00A with application circuit (development board)

1. Connect A-type USB connector (one end of USB cable) to USB port at laptop or PC desktop.

2. Connect another end of USB cable (mini) to UIC00A USB port.
    - Power supply indication green LED will light ON.

3. Continue to software installation if this is the first time usage. Refer to section 6 for software installation guide.

4. Connect one side of programming cable to box header of UIC00A and the other side to box header of development board (target device) to be program.
    - Use external power for the target board, UIC00A cannot support large power usage.
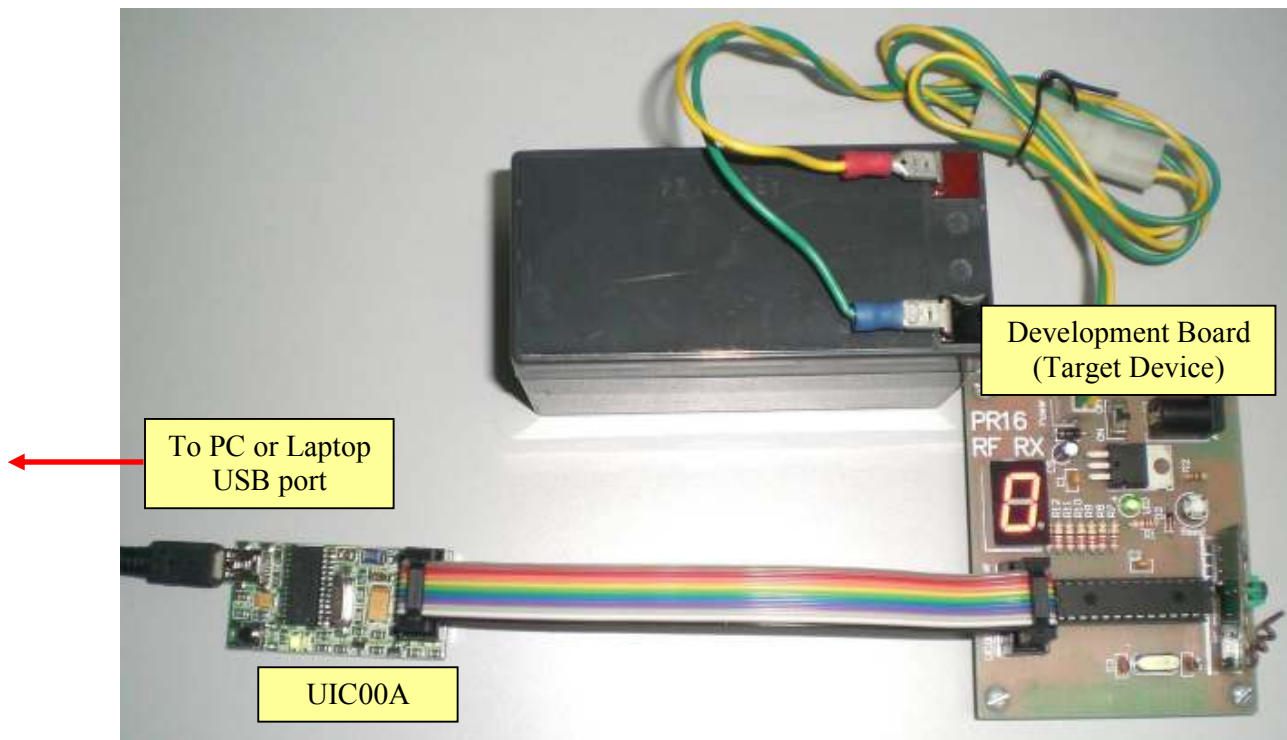
Caution: USB port current limit is 150mA. If the target and UIC00A exceed this current limit, the UIC00A board might be damaged. The target board should be powered externally.

**5.2 Using UIC00A with UIC-S (optional, buy separately)**

1. Connect A-type USB connector (one end of USB cable) to USB port at laptop or PC desktop.

2. Connect another end of USB cable (mini) to UIC00A USB port.
   - Power supply indication green LED will light ON.

3. Continue to software installation if this is the first time usage. Refer to section 6 for software installation guide.

4. Connect one side of programming cable to box header of UIC00A and the other side to box header of UIC-S board.
   - No external power required for UIC-S to function.
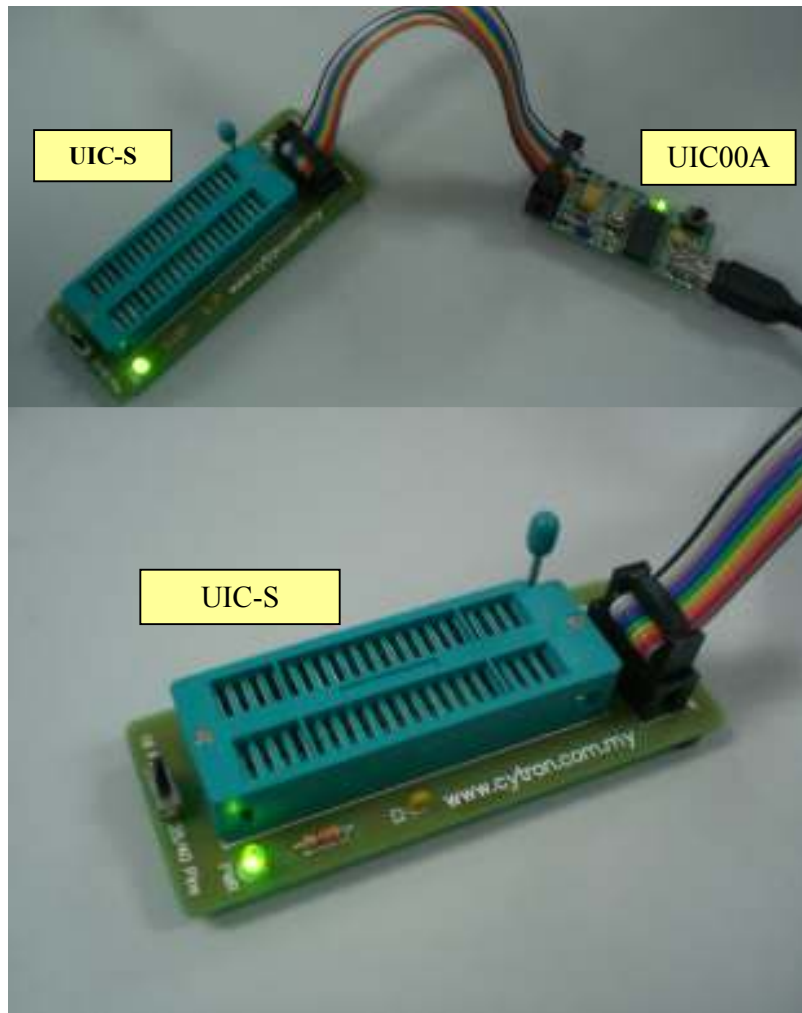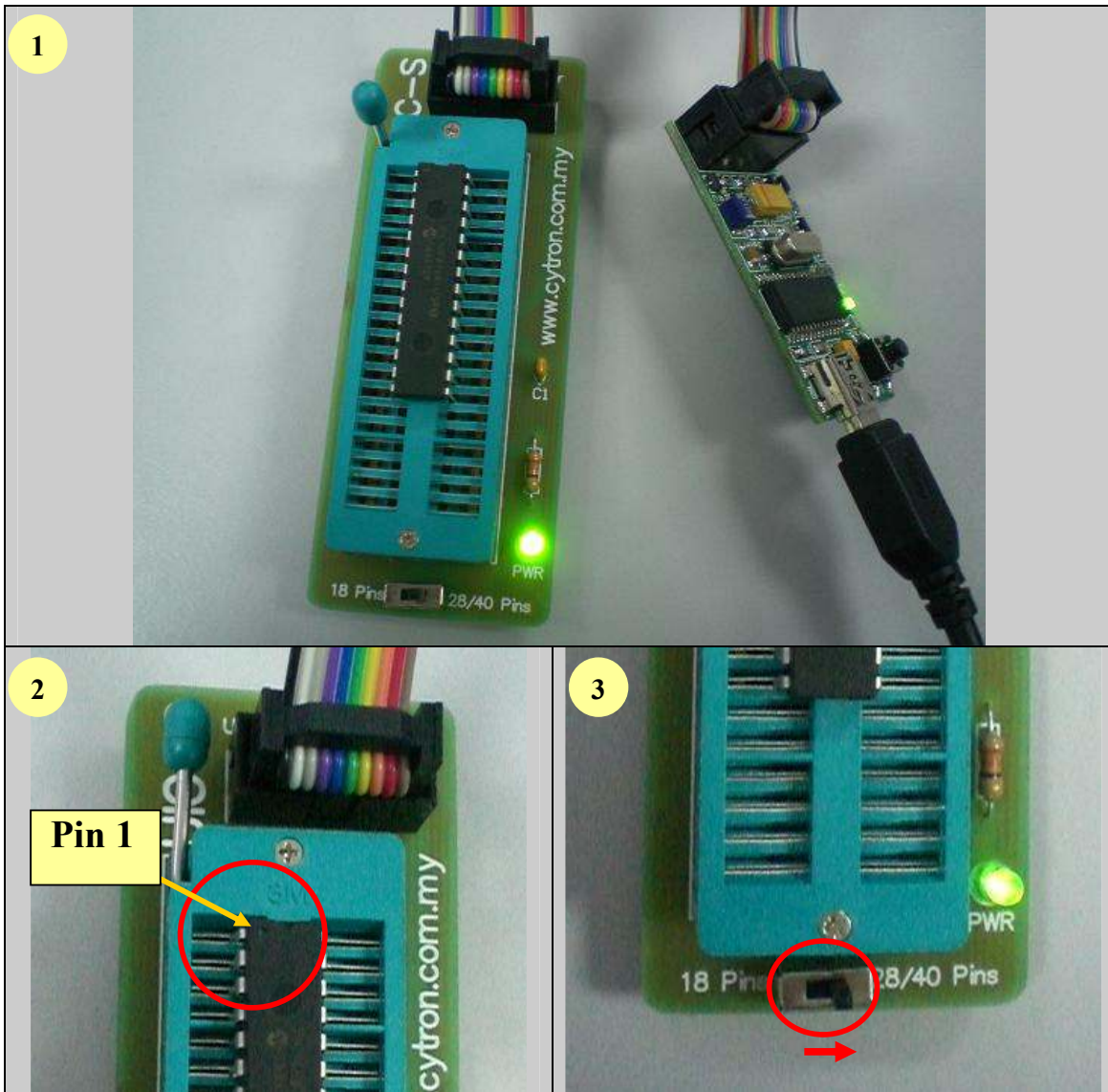
5.2.1 Plugging the microcontroller

40-pin Microcontroller
- Plug in the microcontroller at the ZIF socket and **turn the slide switch** to label "28/40 Pins" as shown below.
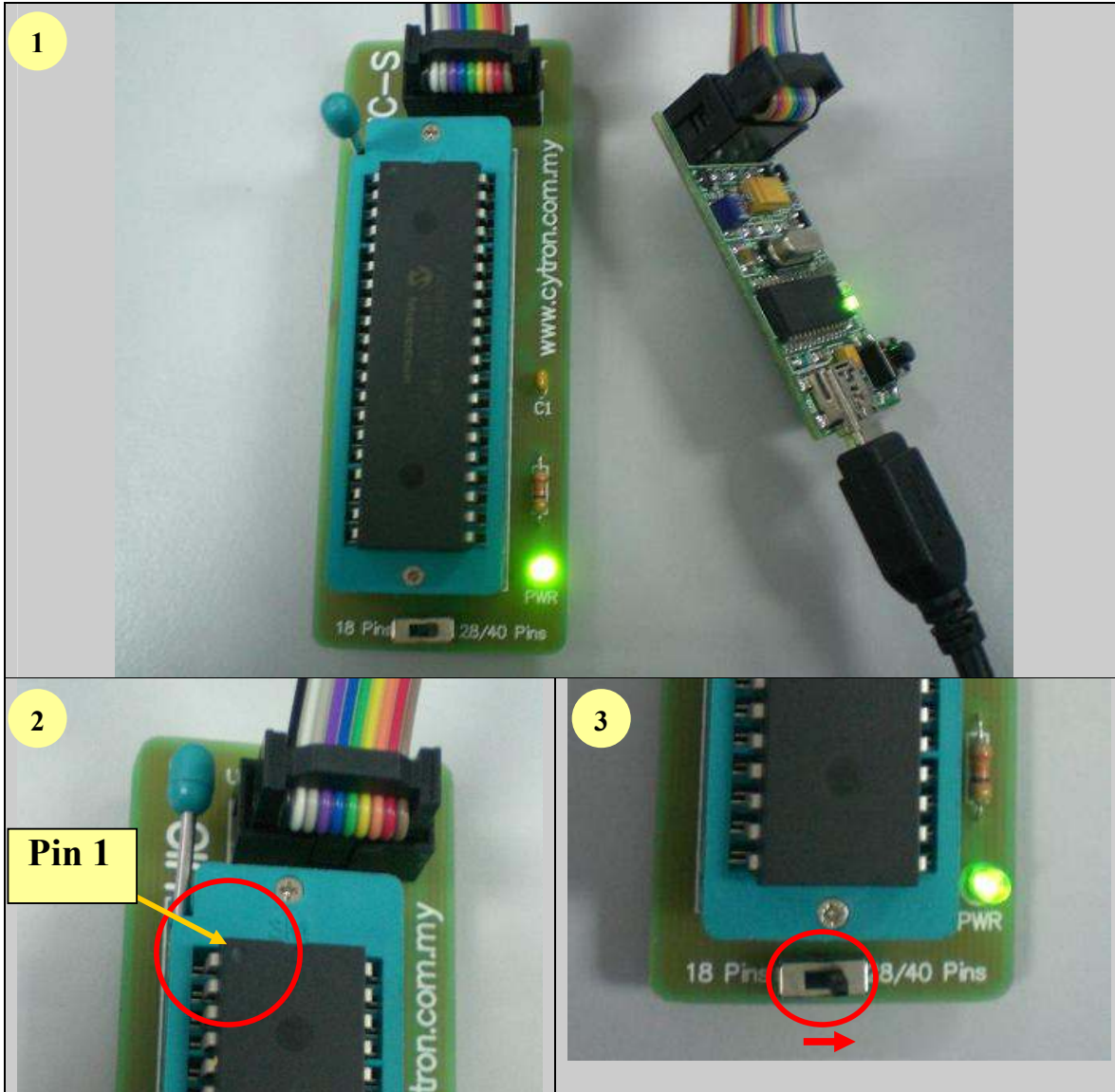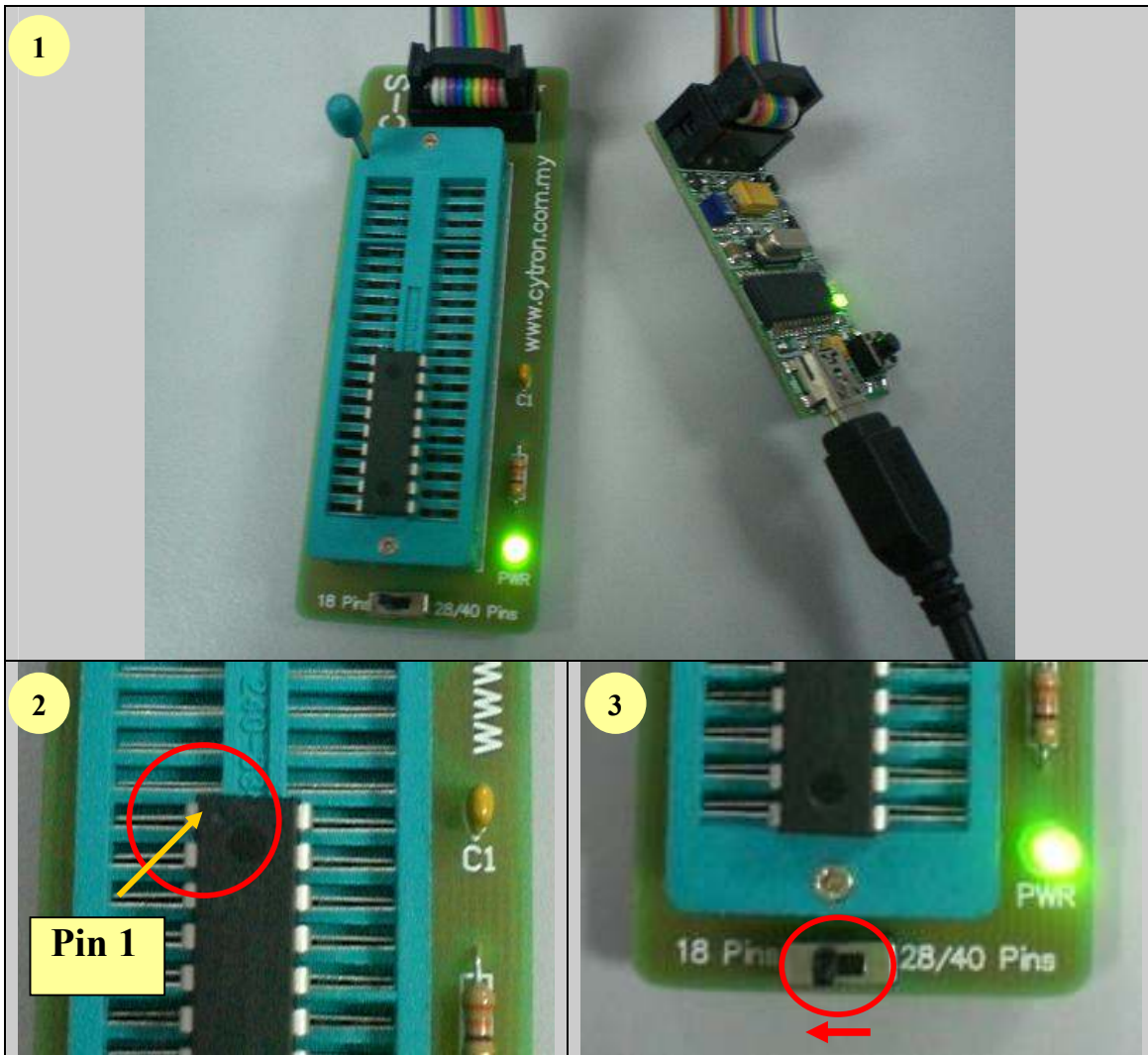
28-pin Microcontroller
- Plug in the microcontroller at the upper portion of the ZIF socket and **turn the slide switch** to label "28/40 Pins" as shown below.

18-pin Microcontroller
- Plug in the microcontroller at the lower portion of the ZIF socket and **turn the slide switch** as shown below.

6. INSTALLATION (SOFTWARE)

Since UIC00A is compatible with PICkit 2, thus PICkit 2 programming software should be installed. With the help of pictures and some simple instruction, following section will guide to install the PICkit 2 programming software.

1. Place UIC00A CD in to computer or laptop CD drive.
2. Browse to folder "UIC00A Setup".
3. Double click "setup" to run the installation wizard.
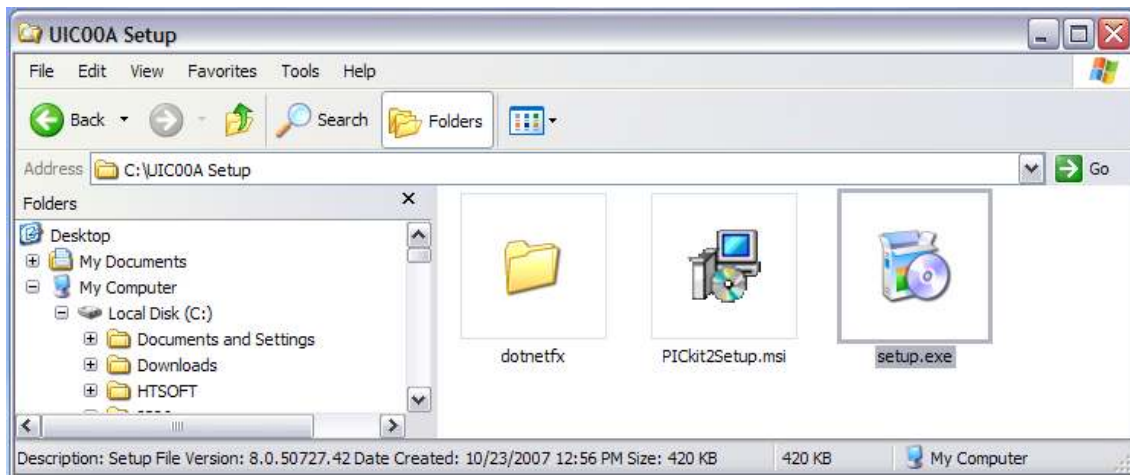
4. In a few moments, introductory window will be displayed. Some Window will required installation of .NET Framework, this might take a few minutes, please be patient. Follow the directions on the screen to begin installing PICkit 2 programming software.

5. The following window concerns the installation folder. Click *Browse* if you want to change the default destination. Assuming change, click on *Next*.
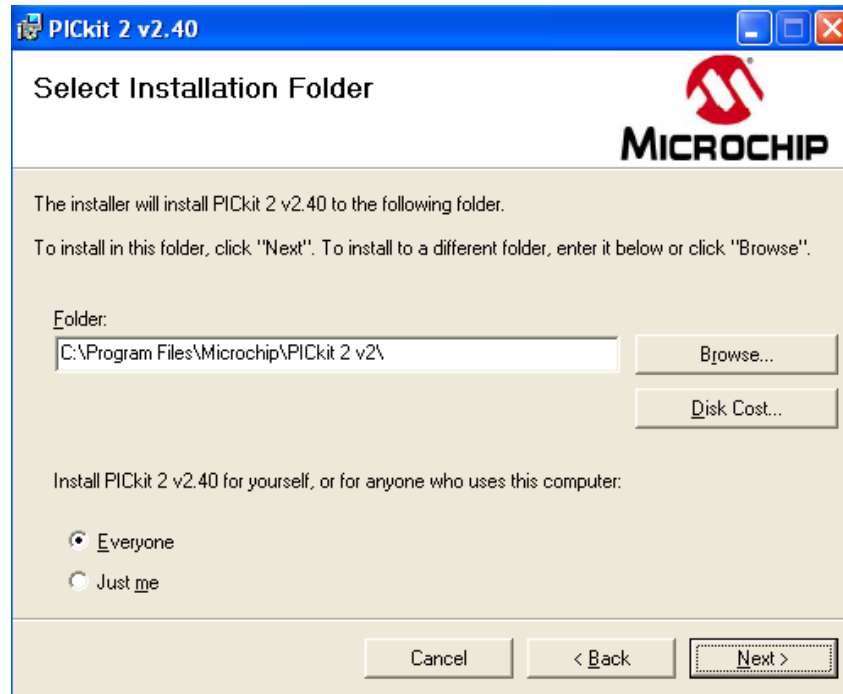
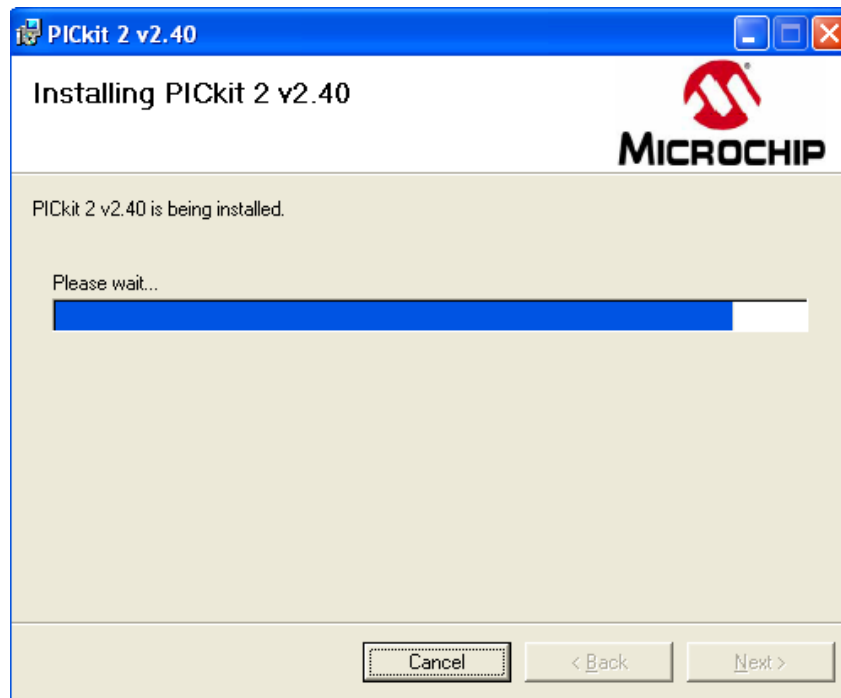6. Click on *Next* to start the installation of the PICkit 2 programming software.
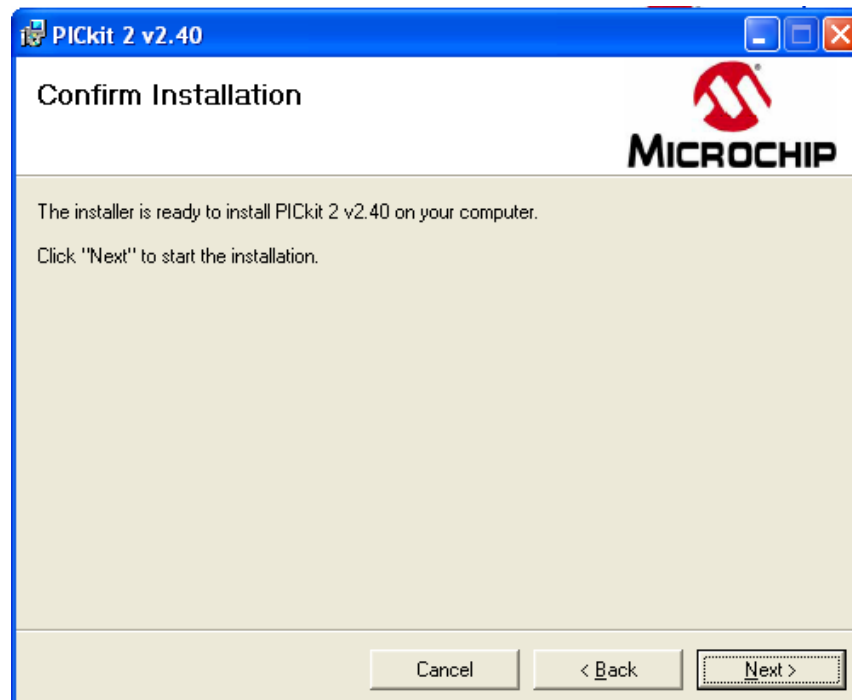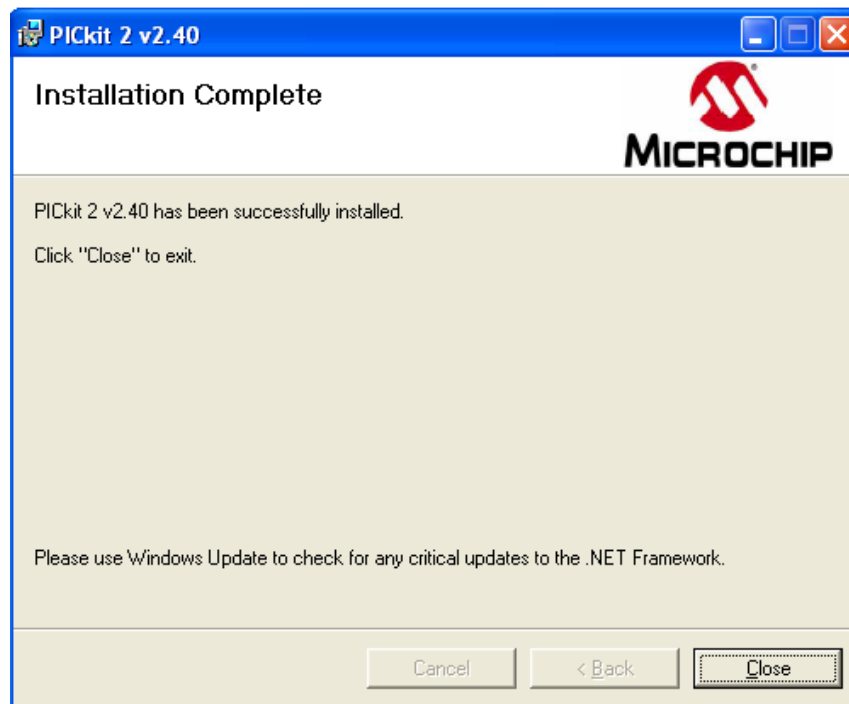
7. The following license agreement window will appears. In order to proceed with the installation, read the conditions, select the option *I Agree* and click on *Next*.
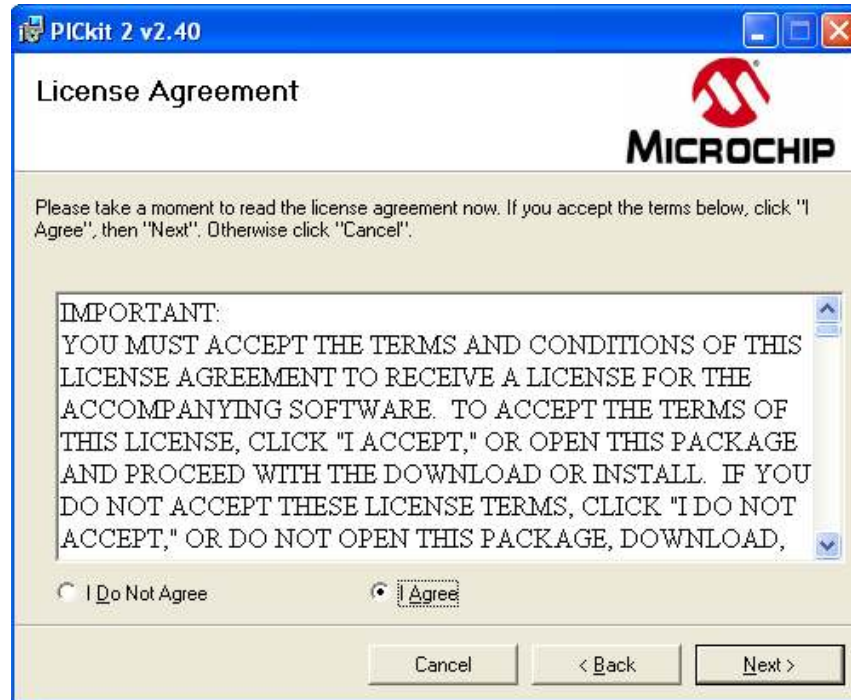
8. The installation flow window will appears and it does not take long. It can be monitored on the screen appears.

9. When installation is complete, click *Close*.

7. GETTING STARTED

7.1 Using PICkit 2 Programmer Software

After installing hardware and software in previous section, UIC00A is ready to be used with PICkit 2 programming software. This section gives instruction on how to get started with UIC00A. With the help of pictures and some simple instruction, following section illustrates the steps using UIC00A.

1. Connect the UIC00A as shown in section 5 (hardware installation).
2. Launch PICkit 2 programming software by selecting *Start> Program> Microchip> PICkit 2*.
   - The following programming interface appears and notifies that the PICkit 2 and target device found and connected.
   - This programmer is able to automatically detect PIC from connected target and display it in the *Device Configuration* window.
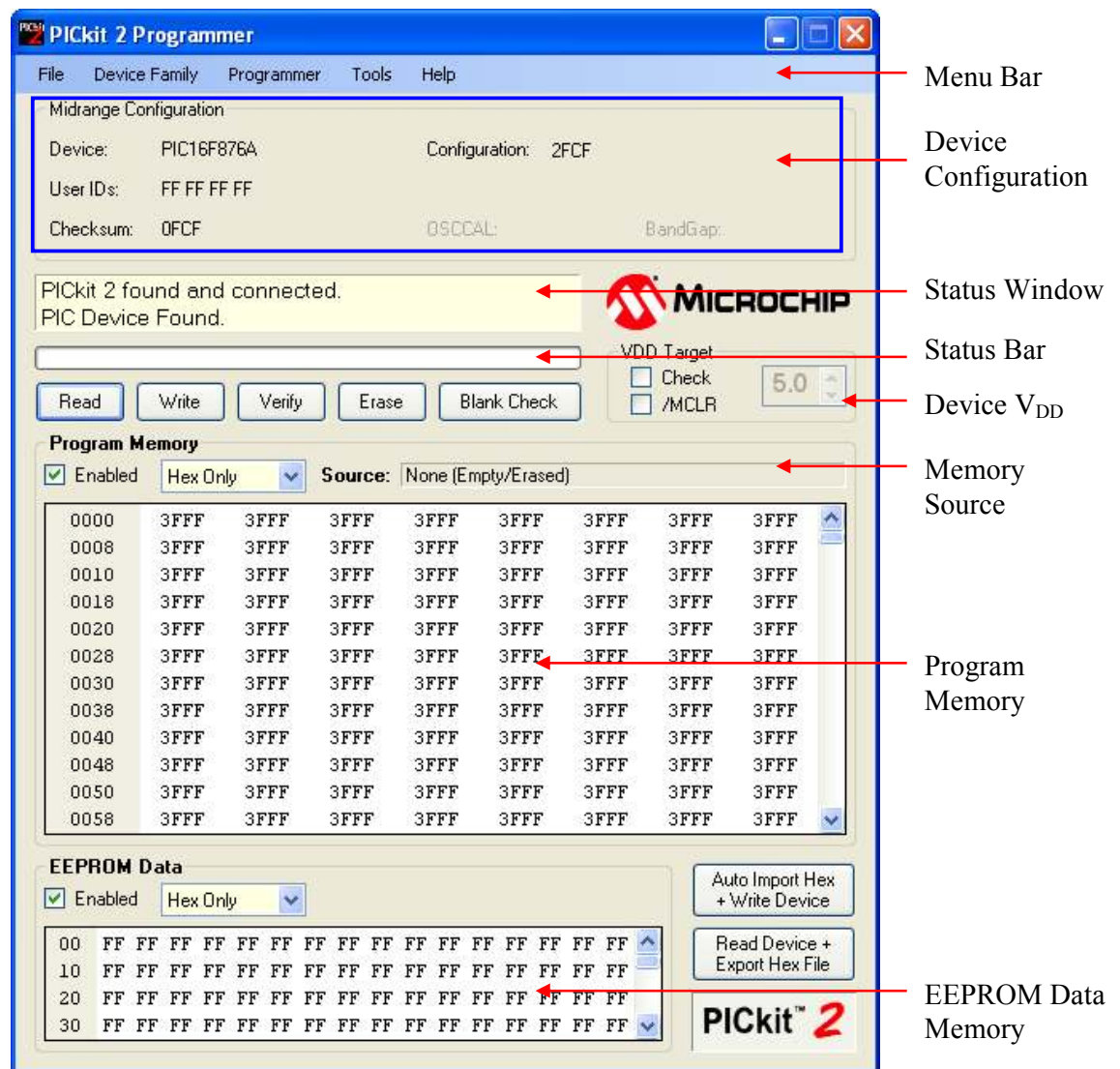
- To connect to the target device once the application software is already running, select *Device Family* as shown in figure below.
- If device is successfully detected, the model name will appeared at "Device Configuration" area.
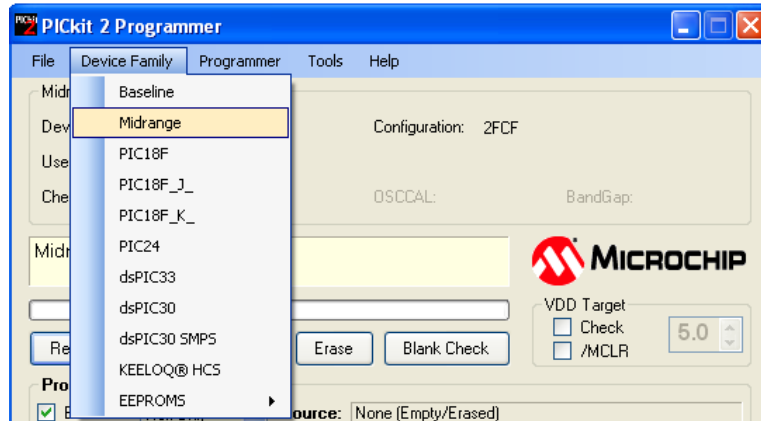
3. UIC00A can supply power to the target device. However, users are advised to power the target device externally to prevent this programmer exceed from 150mA current limit. For UIC00A, the "V_{DD} Target" will automatically be 5.0. User should powered +5V to the target PIC.
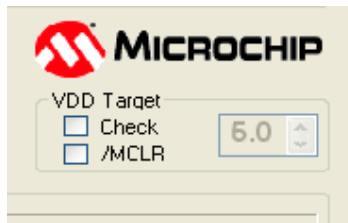
Caution: USB port current limit is 150mA. If the target and UIC00A exceed this current limit, the UIC00A board might be damaged. The target board should be powered externally. If the target device is powered externally, please DONOT connect V_{DD} (5V) of UIC00A to target PIC, only one power supply should be connected to target PIC.

4. Go to *File* and select *Import Hex*. Browse for the Hex file location and open to start import the Hex file.
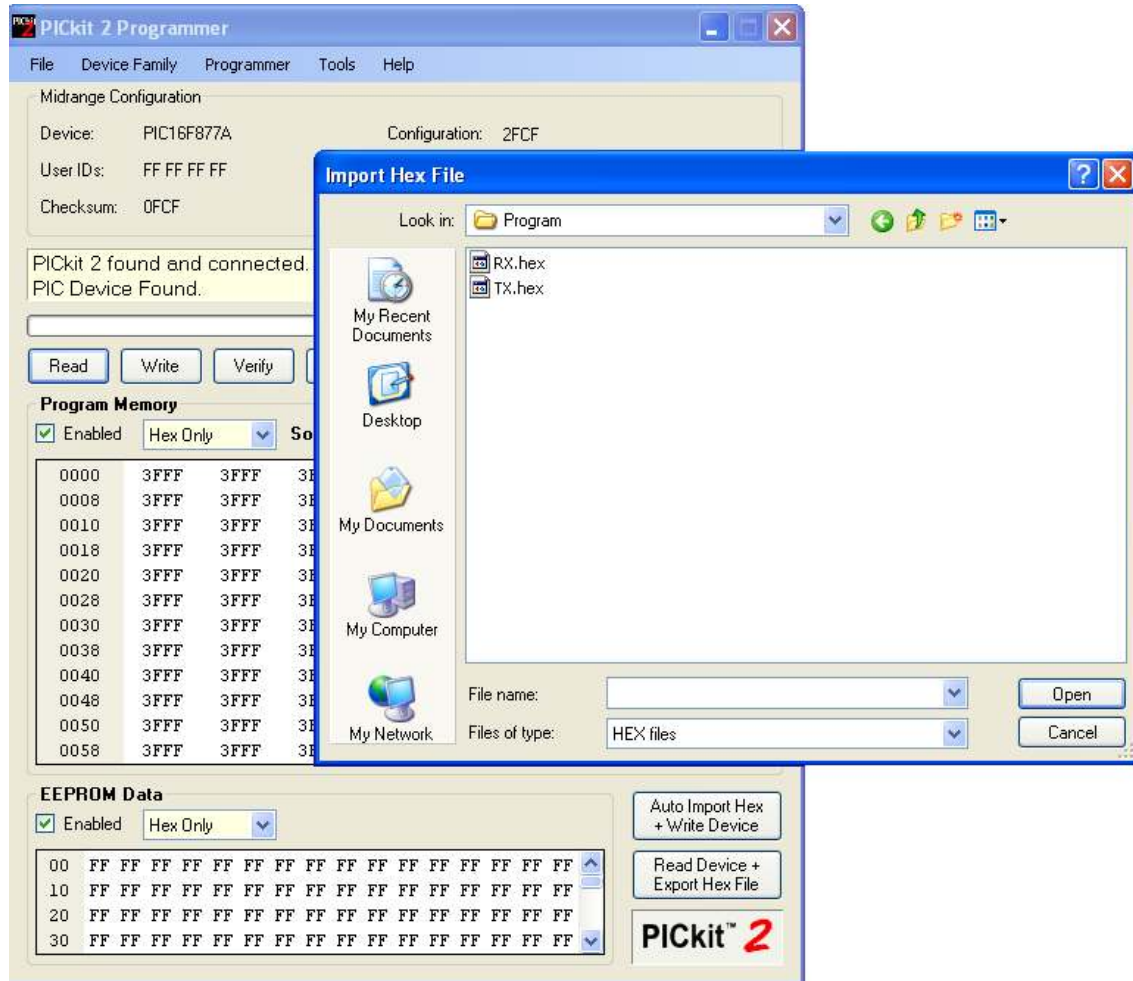
5. After Hex file has been successfully imported, the target device can be programmed by clicking on *Write*. The PIC will be erased and programmed with the new Hex code imported. The operation status will display on the *Status Bar* and the status bar will turn to GREEN if writing is successful.
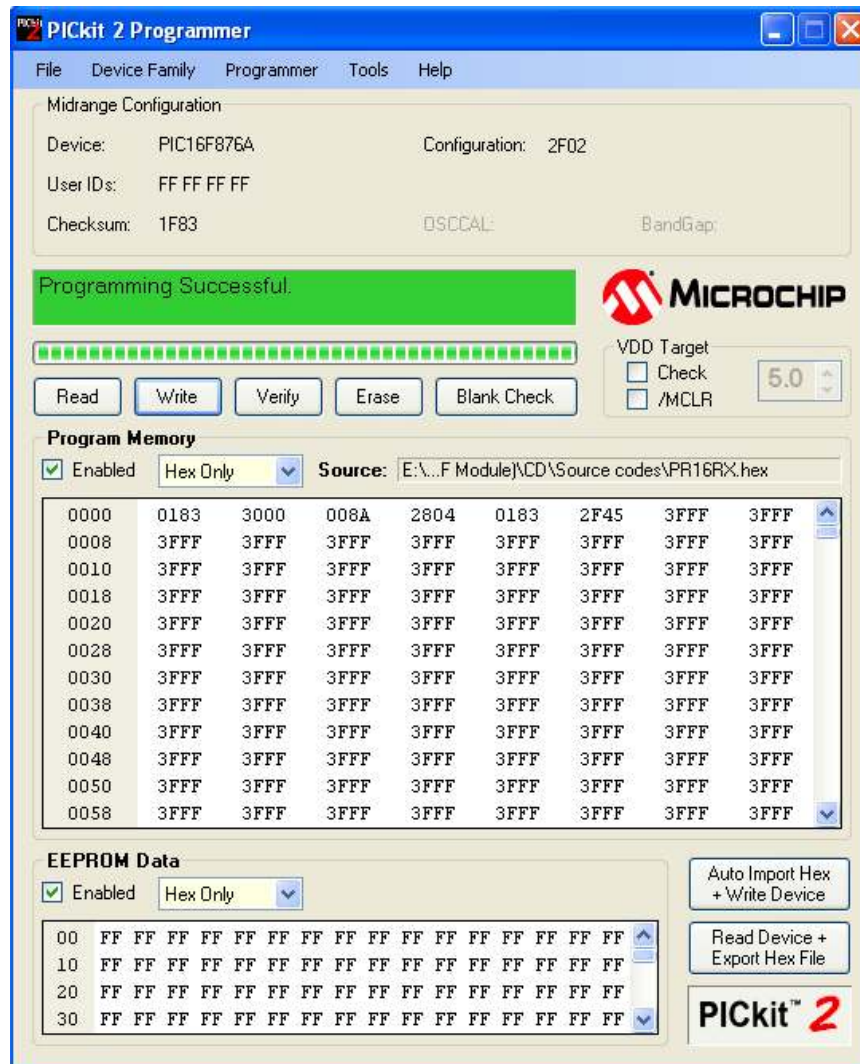
6. Push button (on UIC00A main board) is a special feature to load Hex file into the target device. Push button can be used after *Programmer>Write on PICkit Button* is checked as figure below:
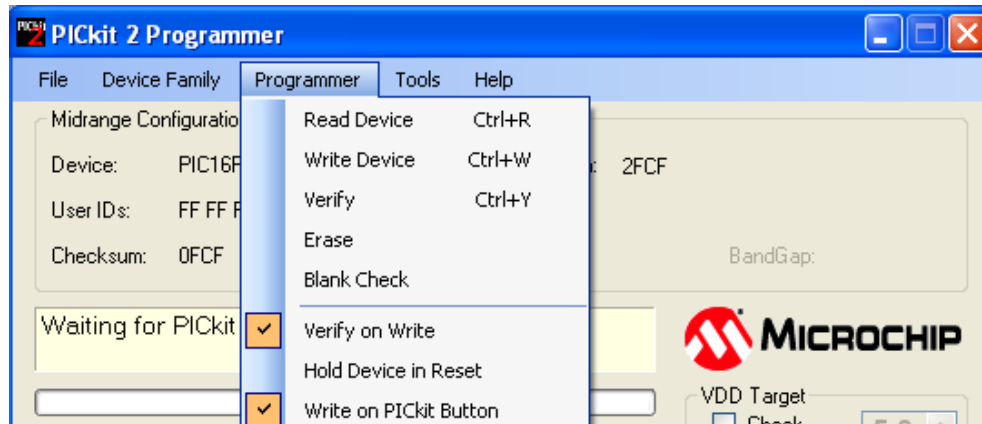
7. After "Write on PICkit Button" is checked, browse for the Hex file location and open to start imported the Hex file.
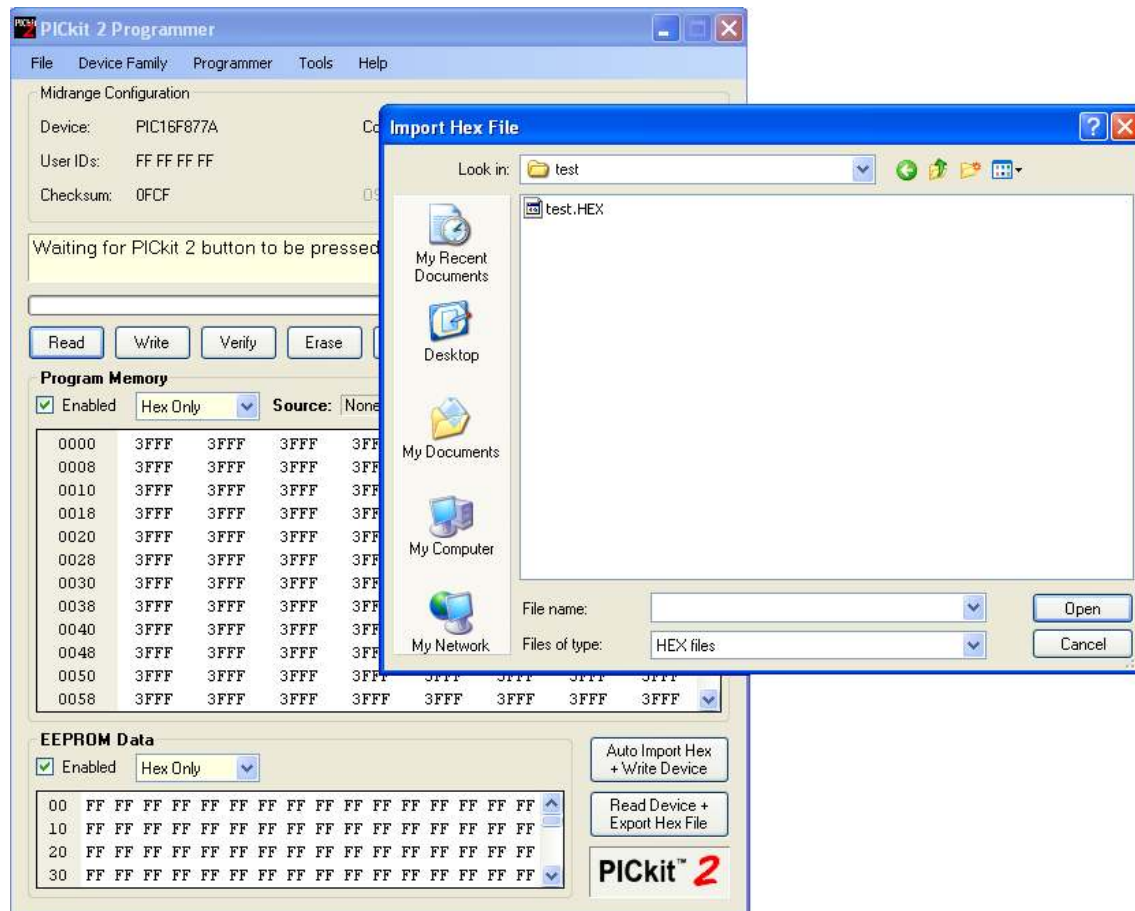
8. Press push button and the Hex file will automatically program into the target device.
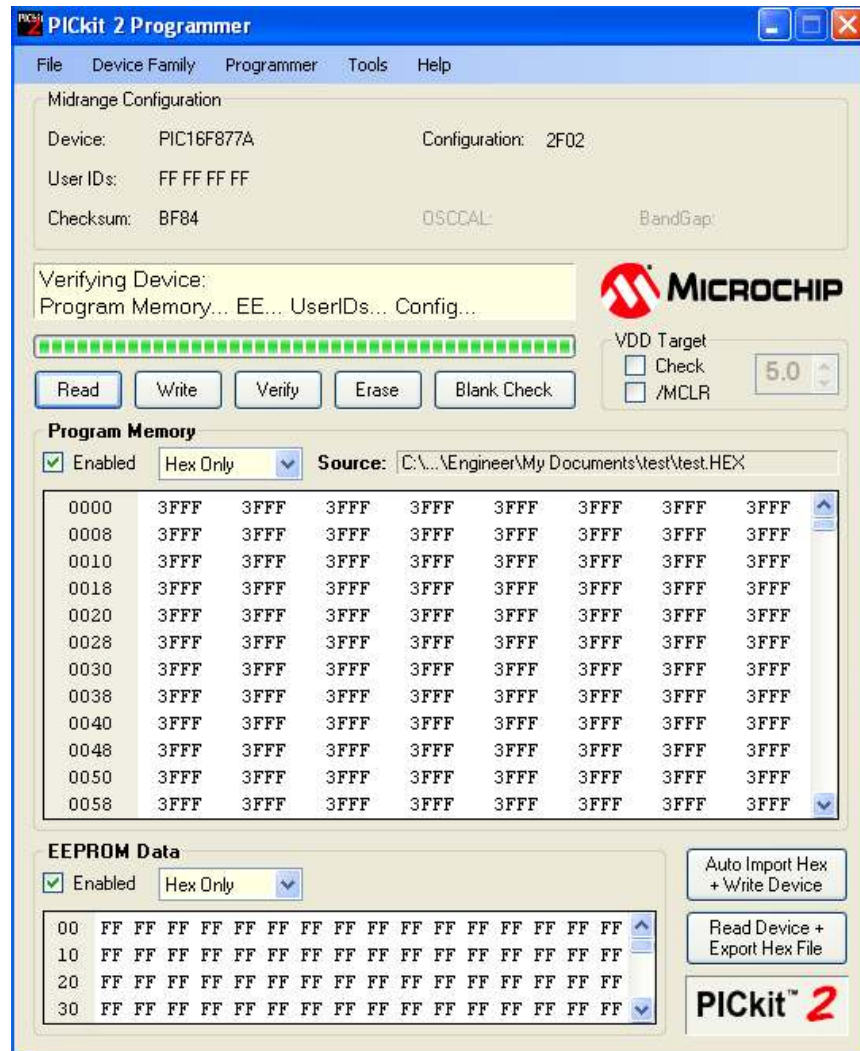
9. Push button allow user to reload the updated hex file into the target device. After convert any changes in the program into Hex file, press push button again and UIC00A will automatically reload the new Hex file, further program into the target device.
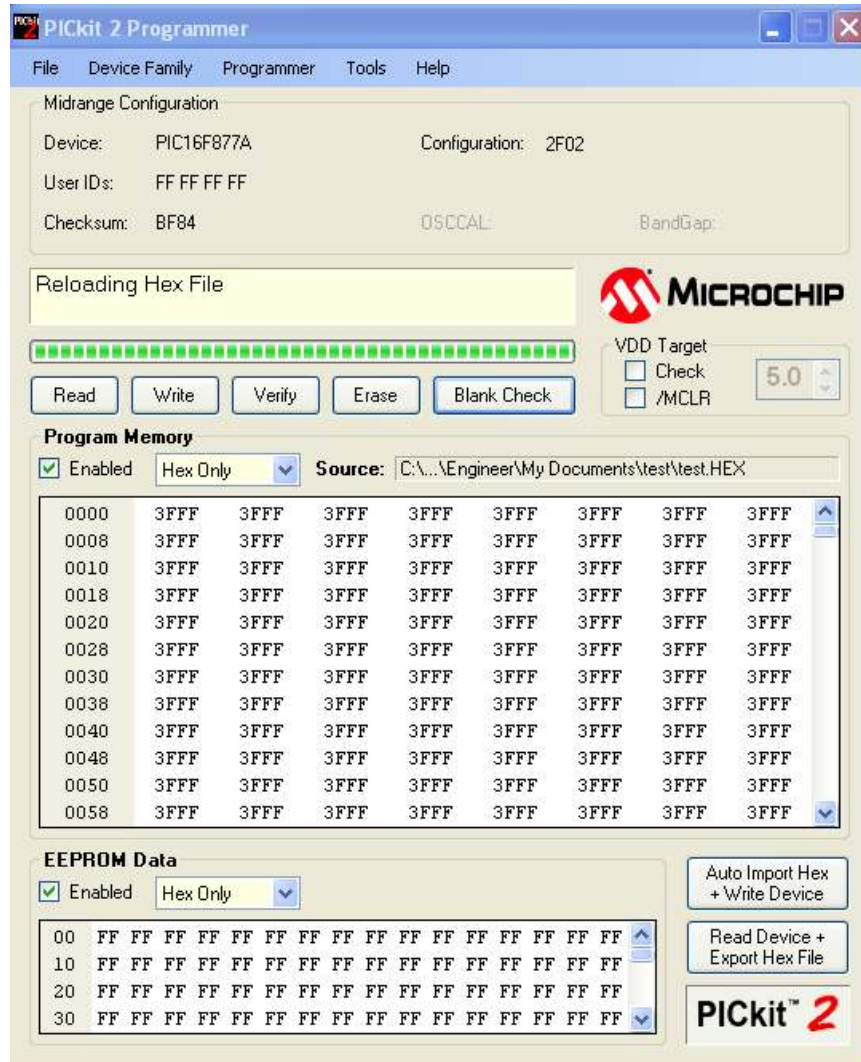
10. *Verify* function verify the device program to the imported Hex file. *Read* function is to view the code written to the PIC. The code will be display in the Program Memory and Data EEPROM Memory. If all zero display, it is possible that the target device is code-protected.

11. *Auto Import Hex + Write Device* allows the programmer to automatically import and write the Hex file to the connected device when the Hex file is updated, for an example on a new firmware build. By clicking this icon, it will bring up an Import Hex File dialog.

12. After selecting file, Hex code will be written to the target device and UIC00A will monitor the selected file for update. If the file is updated (after compiled), UIC00A will automatically re-imports the Hex file and writes to the target device. To disable this feature, simply click this icon again.
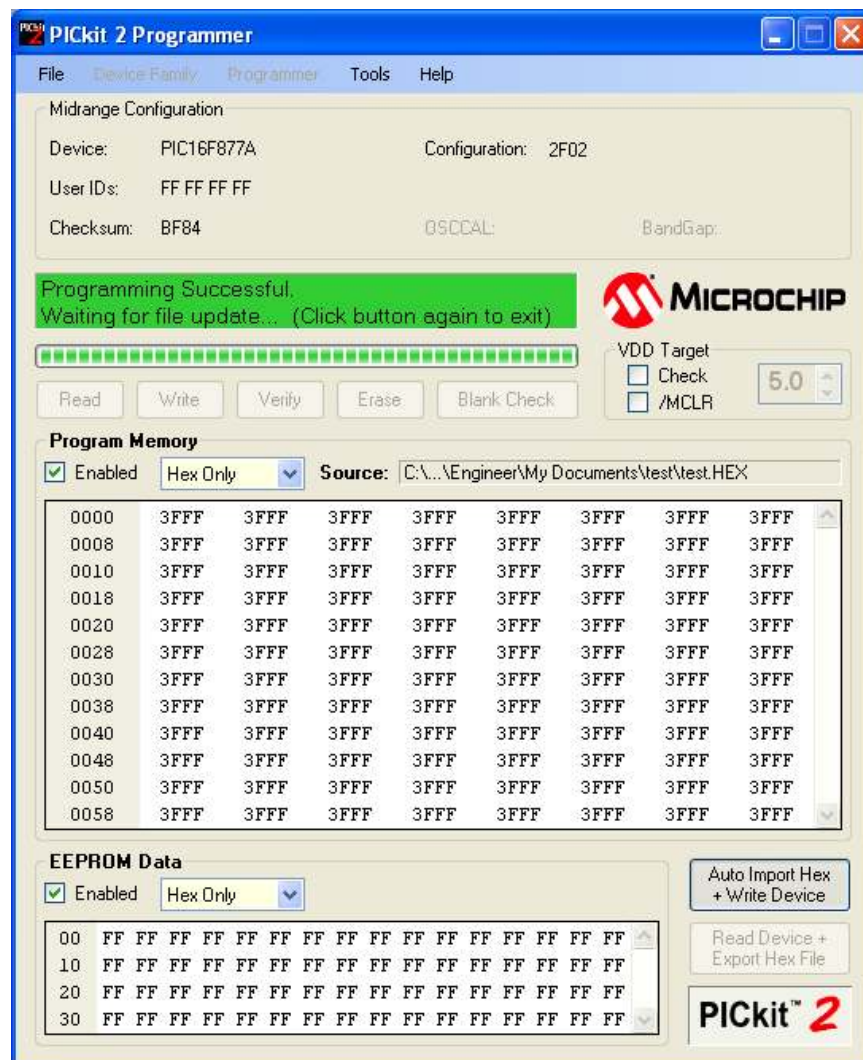
13. For some Window, user might need to update PICkit 2 Operating System as shown in following two figures.
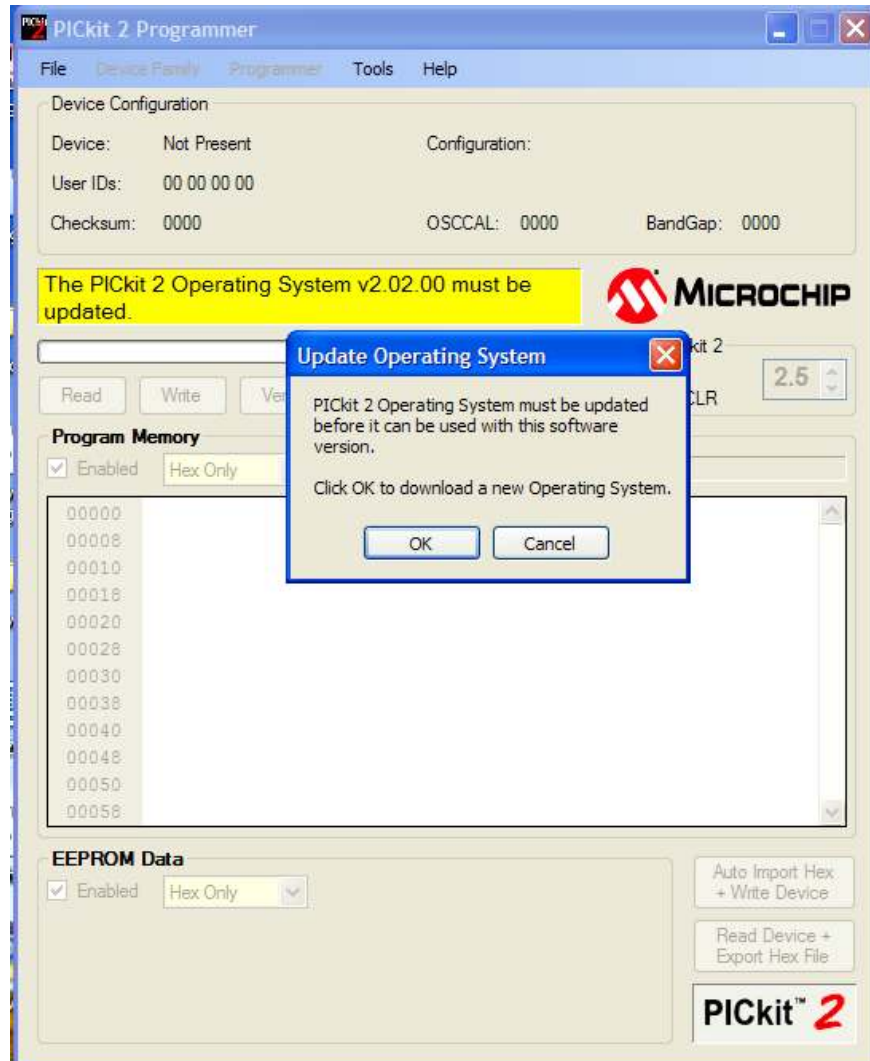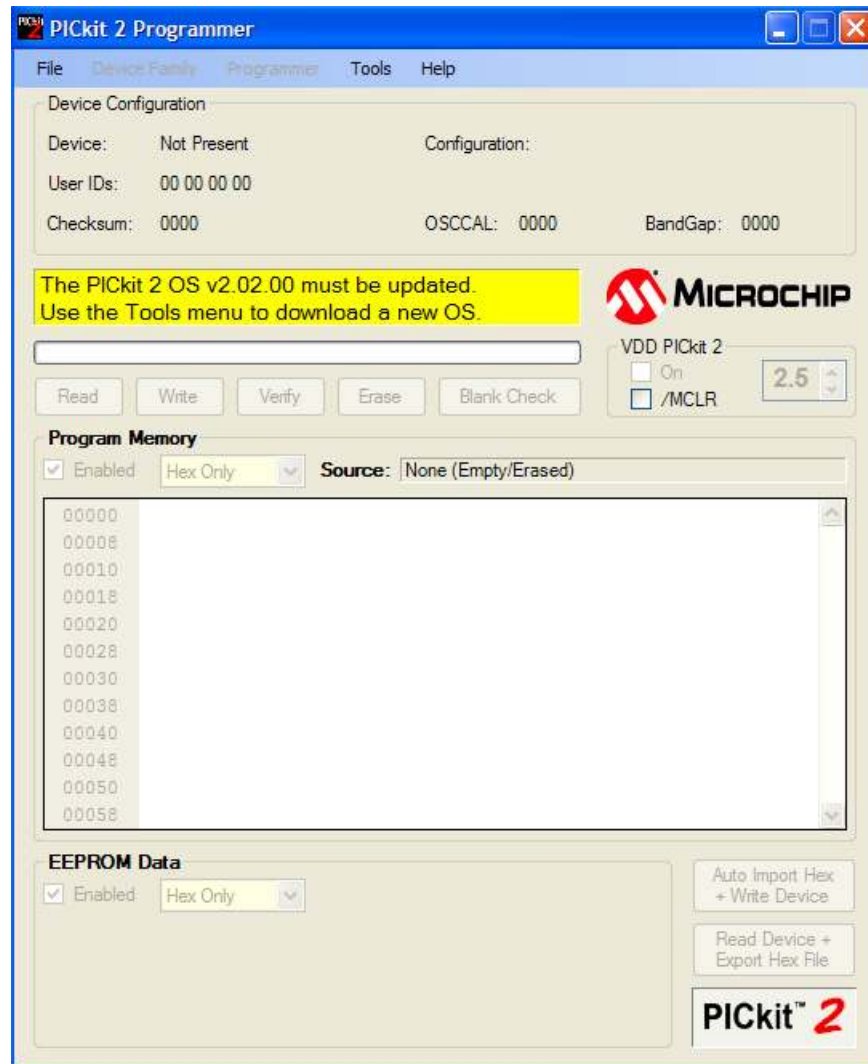
14. Please click OK for first figure, or go to *Tools> Download PICkit 2 Operating System* for second figure.

15. A browse window might appear as shown at following figure. Select the file shown and click Open to proceed. It will automatically update the Operating System. The file should be located in the same folder of PICkit 2 programming software.
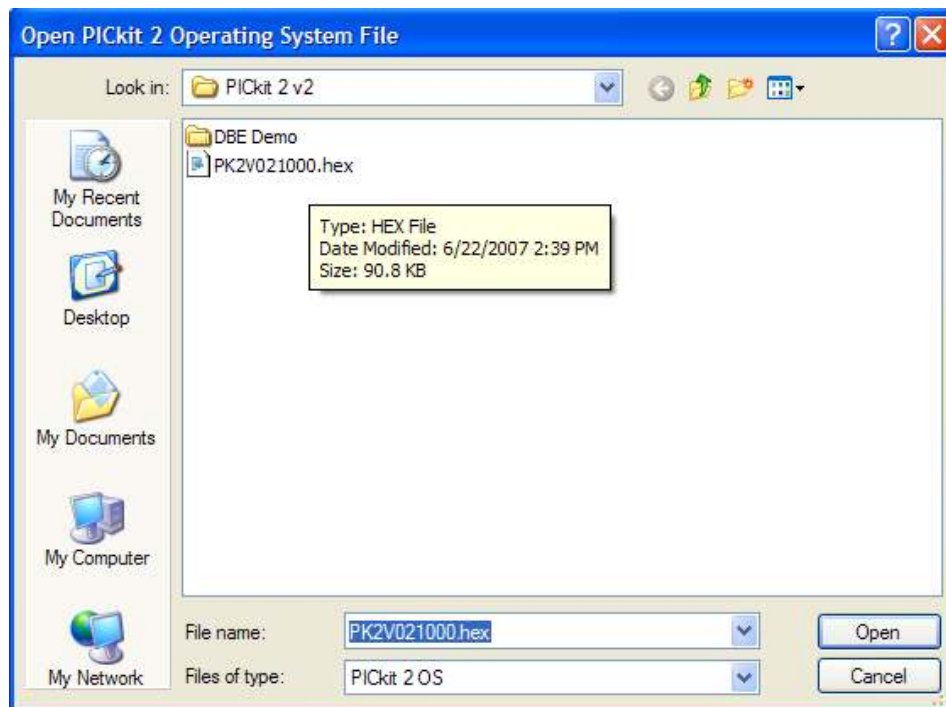
7.2   Using UIC00A

UIC00A can be used in two methods:

1) Program a PIC MCU with the MCU on development board which has been shown in section 5.1.

2) Program a PIC MCU in stand alone mode, shown in section 5.2.

7.2.1   Using UIC00A with application circuit (development board)

UIC00A can program PIC microcontroller installed in the application circuit using In-Circuit Serial Programming (ICSP). In-Circuit Serial Programming requires five signals:

- V_{PP} – Programming voltage. When applied, the device goes into programming mode.
- ICSPCLK/PGC/RB6 – Programming clock; a unidirectional synchronous serial clock line from the programmer to the target.
- ICSPDAT/PGD/RB7 – Programming data; a bidirectional synchronous serial data line.
- V_{DD} (5V) – Power supply positive voltage, it can be either from programmer or application circuit. This is optional to target PIC. If target PIC is powered externally (recommended) this pin should **NOT** be connected to target PIC.
- V_{SS} (Gnd) – Power supply ground reference.

However, the application circuit must be designed to allow all programming signals (Vpp, ICSPCLK/PGC/RB6 and ICSPDAT/PGD/RB7) to connect to the PIC microcontroller device without distorting the programming signals. Figure below shows a typical circuit as a starting point when designing an application circuit for the ICSP. Those unconnected pins (1, 2, 9 & 10) of Box header should **be leaved unconnected** on application circuit.
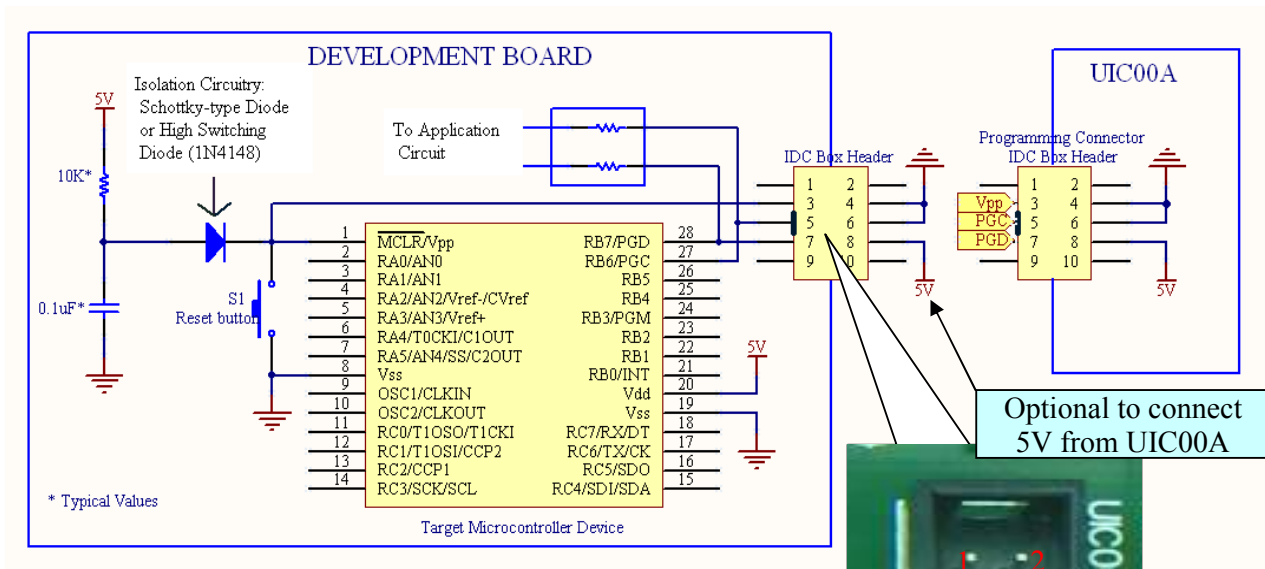
Note: PIC microcontroller in the figure above is for reference purpose only. Refer to chapter 3 for supported PIC models.

Please be aware of:

- During programming mode, V_{PP} voltage will be raised to about 13.25V. It is recommended to isolate the supervisory circuit if interfaces with MCLR pin by using Schottky-type diode or high switching diode (1N4148) to prevent V_{PP} voltage slew rate from slow down and exceeds the rise time in the programming specification (typically 1µs). There should **not** be capacitive component (capacitor) connected to MCLR **directly**.

- RB7/PGD or RB6/PGC pin are recommended to use as output controlling non critical device such as LED, LCD, 7 segments or buzzer. It is recommended to isolated ICSP signals from application circuit by using series resistor (range 220 ohm and above) as shown in figure above. Furthermore, **NO** capacitive component (capacitor) should be connected to these 2 pins directly.

- During ICSP programming, PIC microcontroller needs to be powered. It is recommended to power the target externally; USB is not able to support large power usage. If target PIC is powered externally V_{DD} (5V) should **NOT** be connected to target PIC.

- The **minimum connections** from UIC00A to target board or PIC are **four**. These include **Vpp**, **PGD**, **PGC** and **Vss (Gnd).**

- Thus, the 5V from UIC00A is an **optional connection**. If user is powering up the target board with external power, this pin is not necessary to connect from UIC00A to target board.

- For usage example, please refer to DIY Project (PR7 onwards) in Cytron website.

7.2.2 Using UIC00A with UIC-S (optional, buy separately)

UIC-S is an optional socket that can be used with UIC00A to program several types of PIC microcontroller (except for dsPIC). Below are the steps of using the UIC-S and method to connect it to UIC00A:

1. Connect one side of the rainbow cable (programming cable) to box header of UIC00A board and the other side to box header of UIC-S as shown in section 5.2.

2. LED PWR of UIC-S will ON (once USB connection from UIC00A to computer or laptop is connected) indicate that the board is working correctly.

3. After that, turn the slide switch (on UIC-S) either to 18 pins or 28/40 pins (according to the PIC microcontroller that you want to program).

4. Download the program as shown in section 7.

7.3 **Troubleshooting**

Following section discuss error messages from PICkit 2 programming software, possible root causes and methods to fix it.

    a. Window (right bottom corner) show "Unrecognized USB device" when UIC00A is connected to USB port.
        i)   Please check the connection of your USB cable (computer and also UIC00A).
        ii) Please try to use other USB cable.
        iii) Please try other USB port on computer.
        iv) Please try on other computer.
        v)   If the problem still occur, please contact Cytron at support@cytron.com.my

    b. Status Window shows: "PICkit 2 not found. Check USB connections and use Tools->Check Communication to retry".
        i)   Please reconnect the UIC00A to USB port and try again.
        ii) Driver might not be installed properly, uninstall driver and install again.
        iii) User might need to update Operating System. Please refer to step 14 of chapter 7.
        iv) Check the power LED on UIC00A. If it is Off, UIC00A have hardware problem.

    c. Status Window shows: "No device detected" while Device shows: "No Device Found".
        i)   Please ensure the target PIC is powered with typical voltage of 5V for Vcc.
        ii) Please ensure the **PGC and PCD** is connected to correct pin on target PIC.
        iii) Please ensure the Vss (Gnd) of UIC00A and target PIC is common (connected).

    d. Device shows: "Unsupported part".
        i)   Please ensure the Vss (Gnd) of target PIC is connected.
        ii) Please ensure the target PIC is in supported list.

    e. A small message window shows: "PICkit 2 VPP voltage level error. Check target & retry operation".

        i)   Check MCLR pin of target PIC, it must **not** pulled to ground during programming.
        ii) Check MCLR pin of target PIC, there should not be capacitor connected.

    f. When UIC-S is plug in Green LED at UIC00A is ON but Green LED and UIC-S is not ON.
        i)   UIC00A on board fuse is burned, there might be some place shorted causing this. Please send back for repair, service shipping charges will be required.
        ii) PIC chip spoilt causing short at Vdd (5V) and Vss (Gnd). Change PIC.
        iii) Check the back of UIC-S for any wire or dirt which might be causing the short.

For any feedbacks and inquiries, please send an email to support@cytron.com.my

8. WARRANTY

- ➢ Product warranty is valid for 6 months.
- ➢ Warranty only applies to manufacturing defect.
- ➢ Damage caused by misuse is not covered under warranty.
- ➢ Warranty does not cover freight cost for both ways.

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