PICkit™ 2
Microcontroller Programmer
USER'S GUIDE

Note the following details of the code protection feature on Microchip devices:

• Microchip products meet the specification contained in their particular Microchip Data Sheet.

• Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.

• There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.

• Microchip is willing to work with the customer who is concerned about the integrity of their code.

• Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

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Preface

NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our web site (www.microchip.com) to obtain the latest documentation available.

Documents are identified with a "DS" number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is "DSXXXXXA", where "XXXXX" is the document number and "A" is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB® IDE on-line help. Select the Help menu, and then Topics to open a list of available on-line help files.

INTRODUCTION

This chapter contains general information about this user's guide and customer support that will be useful prior to using the PICkit™ 2 Microcontroller Programmer. Items discussed in this chapter include:

- Document Layout
- Conventions Used in this Guide
- Warranty Registration
- Recommended Reading
- The Microchip Web Site
- Development Systems Customer Change Notification Service
- Customer Support
- Document Revision History
- Troubleshooting

DOCUMENT LAYOUT

This document describes how to use the PICkit™ 2 Microcontroller Programmer. The manual layout is as follows:

- **Chapter 1. PICkit™ 2 Overview** – An overview of the PICkit™ 2 Microcontroller Programmer.
- **Chapter 2. Getting Started** – Provides instruction on how to get started using the PICkit™ 2 Microcontroller Programmer to program Flash-based PICmicro® microcontroller units (MCU).
- **Chapter 3: PICkit™ 2 and ICSP™** – Provides instruction on programming with the PICkit™ 2 Microcontroller Programmer using In-Circuit Serial Programming™ (ICSP™).
- **Chapter 4: Updating the PICkit™ 2 Operating System** – Provides instruction on how to update your PICkit™ 2 Microcontroller Programmer's Operating System.

- **Chapter 5: Troubleshooting** – Provides resolutions for frequently asked questions that solve common problems when using the PICkit™ 2 Microcontroller Programmer.
- **Appendix A: Hardware Schematics** – Illustrates the PICkit™ 2 Microcontroller Programmer hardware schematic diagrams.

CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
Code (Courier font):		
Plain characters	Sample code Filenames and paths	`#define START` `c:\autoexec.bat`
Angle brackets: < >	Variables	`<label>, <exp>`
Square brackets [ ]	Optional arguments	`MPASMWIN [main.asm]`
Curly brackets and pipe character: { | }	Choice of mutually exclusive arguments; An OR selection	`errorlevel {0|1}`
Lowercase characters in quotes	Type of data	`"filename"`

Ellipses...	Used to imply (but not show) additional text that is not relevant to the example	`list`
		`["list_option...,`
		`"list_option"]`

0xnnn	A hexadecimal number where n is a hexadecimal digit	`0xFFFF, 0x007A`
Italic characters	A variable argument; it can be either a type of data (in lowercase characters) or a specific example (in uppercase characters).	`char isascii (char,` `ch);`
Interface (Arial font):		
Underlined, italic text with right arrow	A menu selection from the menu bar	*File > Save*
Bold characters	A window or dialog button to click	**OK**, **Cancel**
Characters in angle brackets < >	A key on the keyboard	<Tab>, <Ctrl-C>
Documents (Arial font):		
Italic characters	Referenced books	*MPLAB® IDE User's Guide*

WARRANTY REGISTRATION

Please complete the enclosed Warranty Registration Card and mail it promptly. Sending in the Warranty Registration Card entitles users to receive new product updates. Interim software releases are available at the Microchip web site.

RECOMMENDED READING

It is recommended that you become familiar with the documents listed below, prior to using the PICkit™ 2 Microcontroller Programmer.

PICkit 2 Low Pin Count Demo Board User's Guide (DSXXXXX)

Consult this document for instructions on how to use Microchip Technology's Low Pin Count devices (8-pin, 14-pin and 20-pin). This document includes a series of tutorials.

MPLAB® IDE, Simulator, Editor User's Guide (DS51025)

Consult this document for more information pertaining to the installation and features of the MPLAB Integrated Development Environment (IDE) Software.

THE MICROCHIP WEB SITE

Microchip provides online support via our web site at www.microchip.com. This web site is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the web site contains the following information:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip consultant program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

DEVELOPMENT SYSTEMS CUSTOMER CHANGE NOTIFICATION SERVICE

Microchip's customer notification service helps keep customers current on Microchip products. Subscribers will receive e-mail notification whenever there are changes, updates, revisions or errata related to a specified product family or development tool of interest.

To register, access the Microchip web site at www.microchip.com, click on Customer Change Notification and follow the registration instructions.

The Development Systems product group categories are:

- **Compilers** – The latest information on Microchip C compilers and other language tools. These include the MPLAB C18 and MPLAB C30 C compilers; MPASM™ and MPLAB ASM30 assemblers; MPLINK™ and MPLAB LINK30 object linkers; and MPLIB™ and MPLAB LIB30 object librarians.
- **Emulators** – The latest information on Microchip in-circuit emulators.This includes the MPLAB ICE 2000 and MPLAB ICE 4000.
- **In-Circuit Debuggers** – The latest information on the Microchip in-circuit debugger, MPLAB ICD 2.
- **MPLAB® IDE** – The latest information on Microchip MPLAB IDE, the Windows® Integrated Development Environment for development systems tools. This list is focused on the MPLAB IDE, MPLAB SIM simulator, MPLAB IDE Project Manager and general editing and debugging features.
- **Programmers** – The latest information on Microchip programmers. These include the MPLAB PM3 and PRO MATE® II device programmers and the PICSTART® Plus and PICkit® 1development programmers.

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CUSTOMER SUPPORT

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support
- Development Systems Information Line

Customers should contact their distributor, representative or field application engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at: http://support.microchip.com

In addition, there is a Development Systems Information Line which lists the latest versions of Microchip's development systems software products. This line also provides information on how customers can receive currently available upgrade kits.

The Development Systems Information Line numbers are:

1-800-755-2345 – United States and most of Canada

1-480-792-7302 – Other International Locations

DOCUMENT REVISION HISTORY

Revision A (May 2005)

- Initial Release of this Document.

TROUBLESHOOTING

- See Chapter 5 for information on common problems.

Chapter 1. PICkit™ 2 Overview

1.1 INTRODUCTION

This chapter introduces the PICkit™ 2 Microcontroller Programmer and describes the PICkit™ 2 Microcontroller Programmer features and menu functions.

1.2 HIGHLIGHTS

This chapter discusses:

- The PICkit™ 2 Contents
- The PICkit™ 2 Overview
- PICkit™ 2 Programming Software

1.3 PICkit™ 2 MICROCONTROLLER PROGRAMMER CONTENTS

The PICkit™ 2 Microcontroller Programmer Kit contains the following items:

1. The PICkit™ 2 Microcontroller Programmer
2. USB cable
3. PICkit™ 2 Starter Kit CD ROM

1.4 INTRODUCING THE PICkit™ 2 MICROCONTROLLER PROGRAMMER

The PICkit™ 2 Microcontroller Programmer is a low cost development programmer. It is capable of programming most of Microchip's Flash microcontrollers. For specific products supported, see the README file included on the PICkit™ 2 Starter Kit CD ROM.

The PICkit™ 2 Microcontroller Programmer Operating System (firmware) can be easily upgraded from the programming software. New device support can be added by updating the operating system. The latest firmware is available on Microchip's web site, www.microchip.com.

> **Note:** The PICkit™ 2 Microcontroller Programmer is intended for development programming. For production programming, please consider the MPLAB PM3 Programmer or other third party programmers designed for the production environment.

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1.5 PICkit™ 2 MICROCONTROLLER PROGRAMMER OVERVIEW

The PICkit™ 2 Microcontroller Programmer overview is shown in Figure 1-1.

FIGURE 1-1: PICkit™ 2 MICROCONTROLLER PROGRAMMER

Legend:

1 – Status LEDs	3 – Lanyard Connection	5 – Pin 1 Marker
2 – Push Button	4 – USB Port Connection	6 – Programming Connector
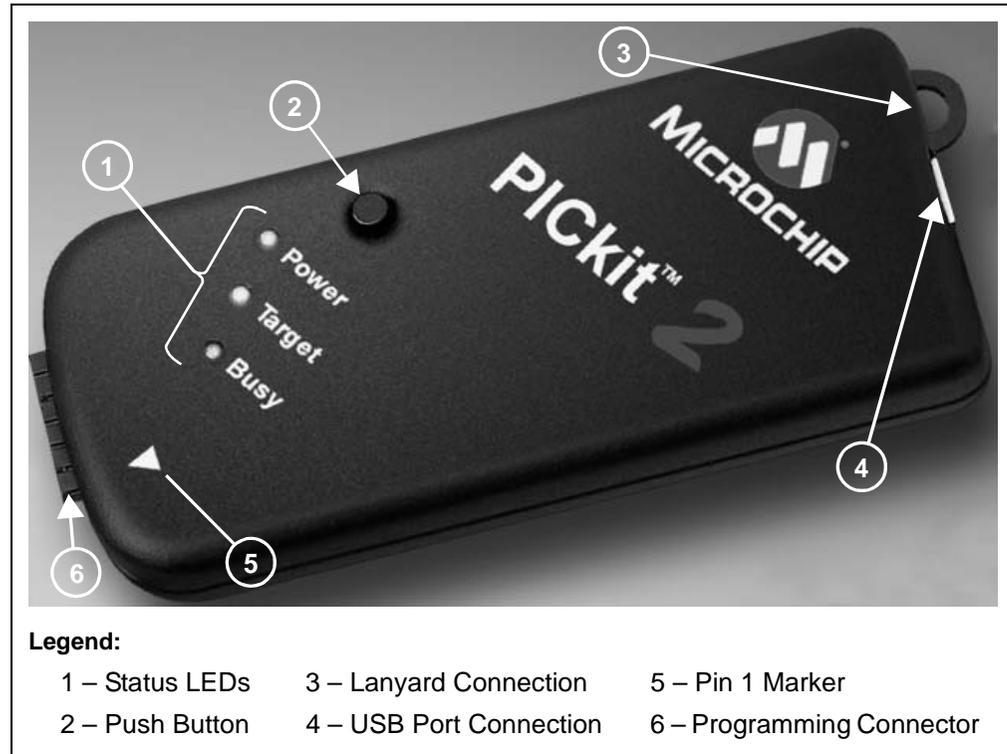
1.5.1 USB Port Connection

The USB Port Connection is a USB mini-B connector. Connect the PICkit™ 2 Microcontroller Programmer to the PC using the supplied USB cable.

1.5.2 Status LEDs

The Status LEDs indicate the status of the PICkit™ 2 Microcontroller Programmer.

1. **Power** (green) – Power is applied to the PICkit™ 2 Microcontroller Programmer via the USB port.
2. **Target** (yellow) – The PICkit™ 2 Microcontroller Programmer is powering the target device.
3. **Busy** (red) – The PICkit™ 2 Microcontroller Programmer is busy with a function such as Program mode or is alerting that a function is in progress.

1.5.3 Push Button

The push button is for initiating a function and presently not implemented.

1.5.4 Programming Connector

The programming connector is a 6-pin connector (0.100" spacing) to connect to the target device. See Figure 1-2 for the pinout specification. Pin 1 is indicated by the triangle.

For more information on how to use the PICkit™ 2 Microcontroller Programmer with In-Circuit Serial Programming™ (ICSP™), refer to **Chapter 3. "PICkit™ 2 and ICSP™"**.

FIGURE 1-2:   **PICkit™ 2 CONNECTOR PINOUT**

Pin Descriptions
1 – $V_{PP}/\overline{MCLR}$
2 – V_{DD} Target
3 – V_{SS} (Ground)
4 – ICSPDAT/PGD
5 – ICSPCLK/PGC
6 – Auxiliary

Note: The connector is a 6-pin header with 0.100" spacing and can accept 0.025" square pins.
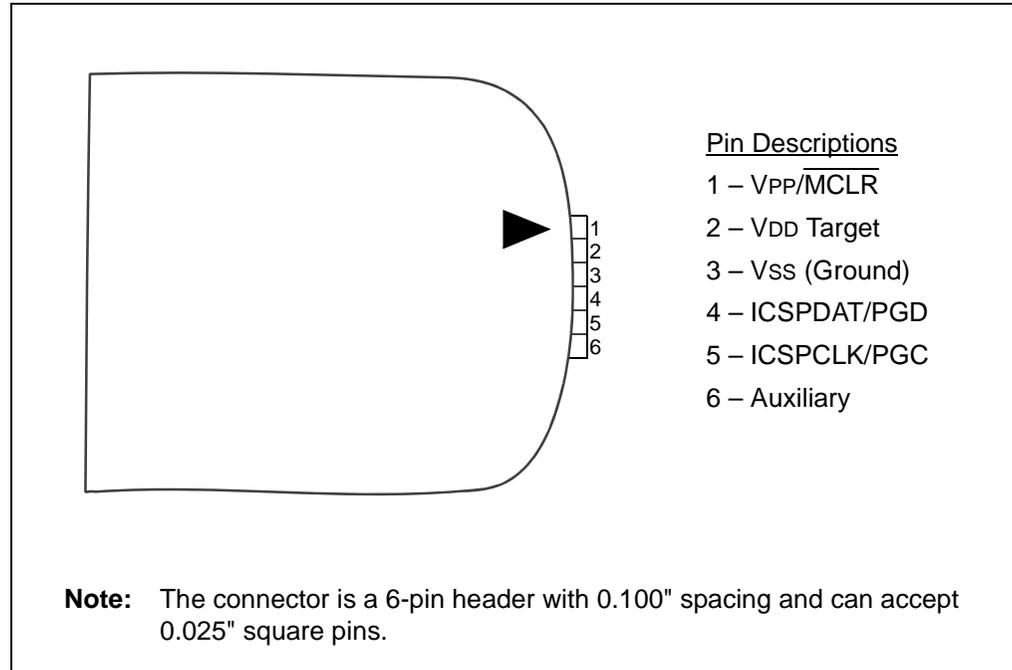
1.5.5 Lanyard Connection

The lanyard connection is a convenient place to attach a lanyard or line to keep the PICkit™ 2 Microcontroller Programmer from becoming lost.

1.6   PROGRAMMING SOFTWARE

Start the PICkit™ 2 Programming Software by selecting *Start > Programs > PICkit 2 Microcontroller Programmer > PICkit 2*. The programming interface appears as shown in Figure 1-3.

For more information on how to use the PICkit™ 2 Programming Software, see **Chapter 2. "Getting Started"**.

FIGURE 1-3:   PICkit™ 2 Programming Software
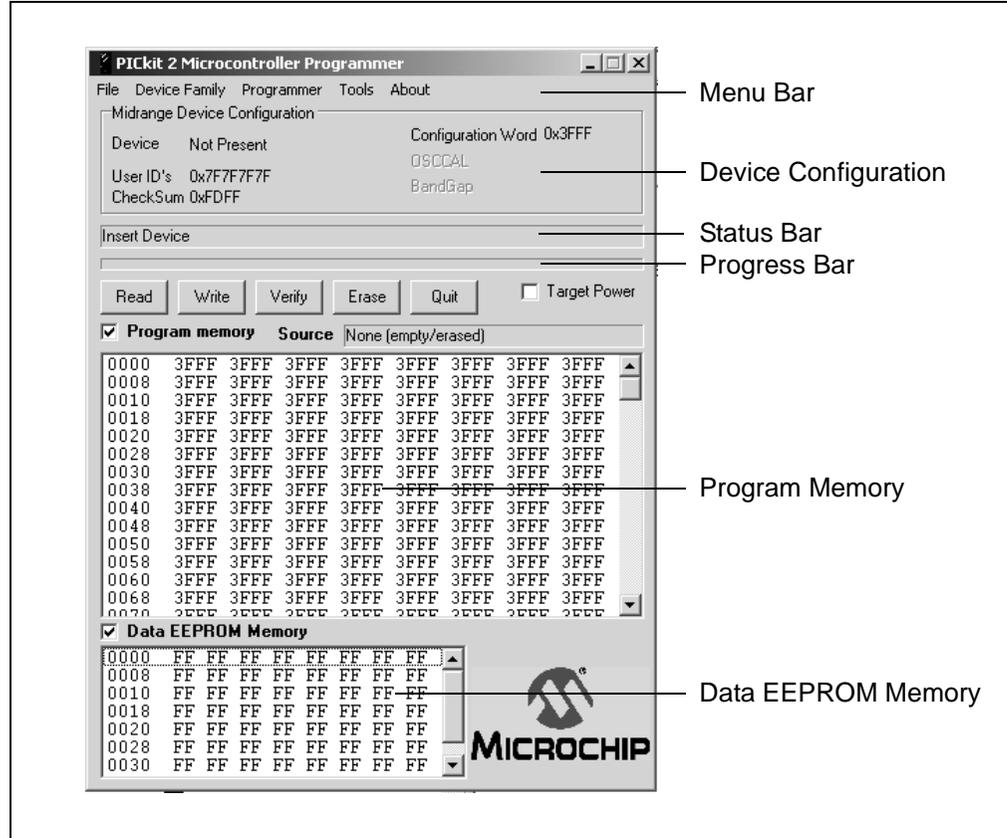
1.6.1   Menu Bar

The menu bar selects various functions of the PICkit™ 2 Programming Software. A summary of the functions are:

FILE

> Import File – Import a hex file for programming
>
> Export File – Export a hex file read from a device
>
> Exit – Exit the program (duplicated with the **Quit** button)

DEVICE FAMILY

> Baseline (12-bit Core) – Configures the programming software for baseline Flash devices
>
> Mid-range (14-bit Core) – Configure the programming software for mid-range Flash devices
>
> PIC18 – Configures the programming software for PIC18F Flash devices (future feature, presently grayed out)
>
> PIC18J – Configures the programming software for PIC18FXXJXX Flash devices (future feature, presently grayed out)
>
> dsPIC – Configures the programming software for dsPIC Flash devices (future feature, presently grayed out)

PROGRAMMER

> Read Device – Reads program memory, data EEPROM memory, ID locations, and configuration bits.
>
> Write Device – Writes program memory, data EEPROM memory, ID locations, and configuration bits.
>
> Verify – Verifies program memory, data EEPROM memory, ID locations and configuration bits read from the target MCU against the code stored in the programming software.
>
> Erase – Performs a bulk erase of the target MCU. OSCCAL and band gap values are preserved (PIC12F629/675 and PIC16F630/676 only).
>
> Blank Check – Performs a blank check of program memory, data EEPROM memory, ID locations and configuration bits.
>
> Full Erase (OSCCAL and BG erased) – Performs a bulk erase including the OSCCAL and Band Gap (BG) values (PIC12F629/675 and PIC16F630/676 only).
>
> Regenerate OSCCAL – Regenerates the OSCCAL value (only for PIC12F629/675 and PIC16F630/676). The AUX line must be connected to the RA4/T1G pin.
>
> Set Band Gap Calibration Value – Sets the band gap value (only for PIC12F629/675 and PIC16F630/676).

TOOLS

> Code-Protect Device – Enables code protection features of the microcontroller on future write operations.
>
> Target Power – Power target from PICkit™ 2 Microcontroller Programmer.
>
> Check Board – Verifies communication with the PICkit™ 2 Microcontroller Programmer and reads the device ID of the target MCU.
>
> Download PICkit 2 Operating System – Performs a download of the PICkit™ 2 Microcontroller Programmer firmware operating system.

ABOUT

> This displays a dialog box indicating the version and date.

1.6.2   Device Configuration

The Device Configuration window displays the PICmicro MCU device, User ID, Configuration Word and Checksum. It also displays OSCCAL and Band Gap, which are available only on PIC12F629/675 and PIC16F630/676 devices.

For mid-range (14-bit core) devices, the PICkit™ 2 Microcontroller Programmer reads the device ID and displays it in the window.

For baseline (12-bit core) devices, the user must select the device from a drop down box.

1.6.3   Status Bar

The status bar displays text status of the operations in progress. If an operation is successful, the status bar will display green background. If an operation fails, the status bar will display red. If an operation alerts a caution, the status bar will display yellow.

1.6.4   Progress Bar

The progress bar displays the progress of an operation.

1.6.5   Program Memory

Program code can be loaded into the PICkit™ 2 Programming Software from *File > Import HEX* or it can be read from the device by clicking on the **Read** button. The origin of the code is displayed in the Source block. The Program Memory window displays the program code in hexadecimal. The code cannot be edited in the window.

The check box next to the Program Memory window controls whether the program memory will be programmed into the device or not. If the box is checked, the code displayed in the Program Memory window will be programmed into and used to verify the device. If the box is not checked, the program memory will not be programmed and it will not be used to verify the device.

1.6.6   Data EEPROM Memory

Similar to Program Memory above, program code can be loaded into the PICkit™ 2 Programming Software from *File > Import HEX* or it can be read from the device by clicking on the **Read** button. The origin of the code is displayed in the Source block. The Data EEPROM Memory window displays the program code in hexadecimal. The code cannot be edited in the window.

The check box next to the Data EEPROM Memory window controls whether the data EEPROM memory will be programmed into the device or not. If the box is checked, the code displayed in the Data EEPROM Memory window will be programmed into and used to verify the device. If the box is not checked, the data EEPROM memory will not be programmed and it will not be used to verify the device.

Chapter 2. Getting Started

2.1 INTRODUCTION

This chapter gives instruction on how to get started using the PICkit 2 Microcontroller Programmer to program Flash-based PICmicro® microcontroller units (MCU).

For information on how to use the PICkit 2 Microcontroller Programmer with In-Circuit Serial Programming™ (ICSP™), refer to **Chapter 3. "PICkit™ 2 and ICSP™"**.

For information on how to update the PICkit 2 firmware operating system, refer to **Chapter 4. "Updating the PICkit™ 2 Operating System"**.

2.2 INSTALLING THE PICkit 2 PROGRAMMING SOFTWARE

Insert the PICkit™ 2 Starter Kit CD ROM into the CD ROM drive. In a few moments, the introductory screen should be displayed. Follow the directions on the screen for installing the PICkit™ 2 Programming Software.

If the introductory screen does not appear, browse to the CD ROM directory and select the `AutorunPro.exe` program.

2.3 USING THE PICkit 2 PROGRAMMING SOFTWARE

Start the PICkit™ 2 Programming Software by selecting *Start > Programs > PICkit 2 Microcontroller Programmer > PICkit 2*. The programming interface appears as shown in Figure 2-1.

FIGURE 2-1:   PICkit 2 PROGRAMMING SOFTWARE

PICkit™ 2 User's Guide
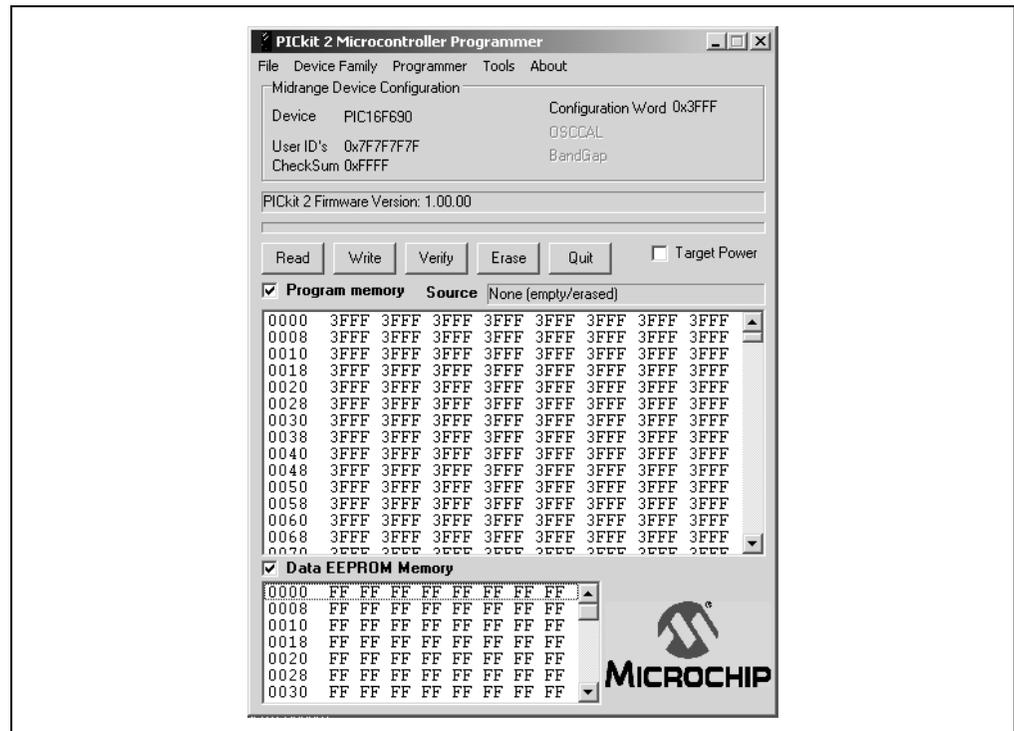
2.3.1 Selecting the Device Family

The PICkit 2 Microcontroller Programmer is capable of programming a variety of Flash-based Microchip PICmicro® microcontrollers.

The first step in using the PICkit 2 Microcontroller Programmer is to select the device family by clicking on the Device Family menu as shown in Figure 2-2.

FIGURE 2-2:   **SELECT DEVICE FAMILY**
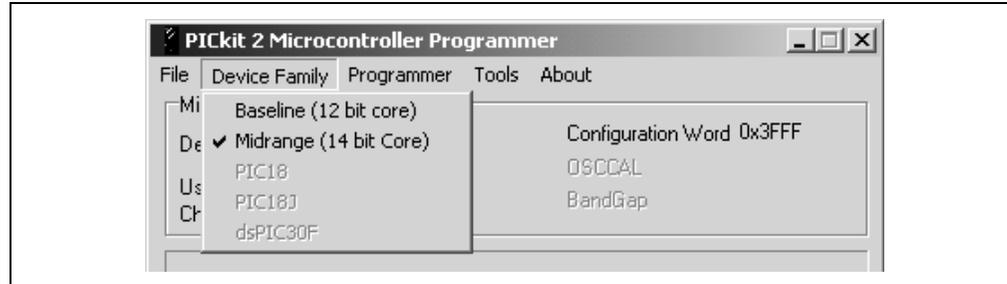
2.3.2 Device Identification

If the Mid-range (14-bit core) Flash device family is selected, the PICkit 2 Microcontroller Programmer will automatically read the device ID word from PICmicro® MCU and display it in the Configuration window as shown in Figure 2-3.

FIGURE 2-3:   **IDENTIFY DEVICE**
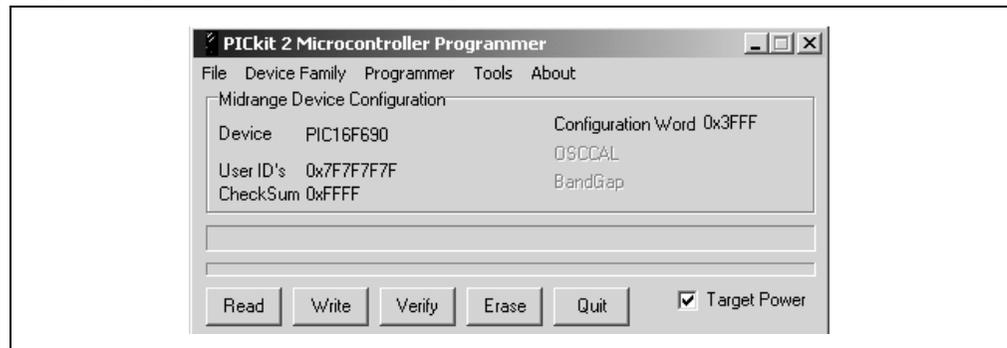
If the Baseline (12-bit core) Flash device family is selected, the user must select the specific device from the device drop down box as shown in Figure 2-4.

CAUTION

Ensure that the correct Baseline Flash device has been selected. These devices do not contain a device ID to confirm device selection. Choosing the wrong Baseline Flash device may cause an erasing of the OSCCAL value stored in the last memory location.

FIGURE 2-4:   **SELECT BASELINE FLASH DEVICE**
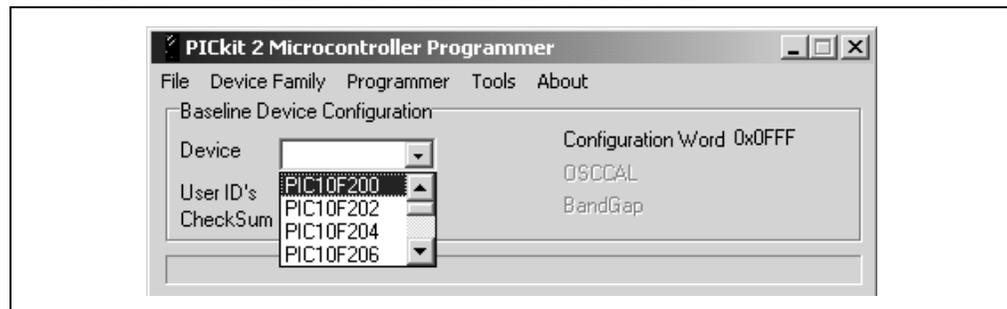
2.3.3   Target Power

The PICkit 2 Microcontroller Programmer can supply power to the target. To enable power to the target device, check the Target Power check box as shown in Figure 2-5.

> **Note:**   When starting the PICkit 2 Microcontroller Program, target power defaults to off.

CAUTION

The USB port current limit is set to 100 mA. If the target plus PICkit 2 Microcontroller Programmer exceed this current limit, the USB port will turn off. The target may be powered externally if more power is required.

FIGURE 2-5:   ENABLE TARGET POWER
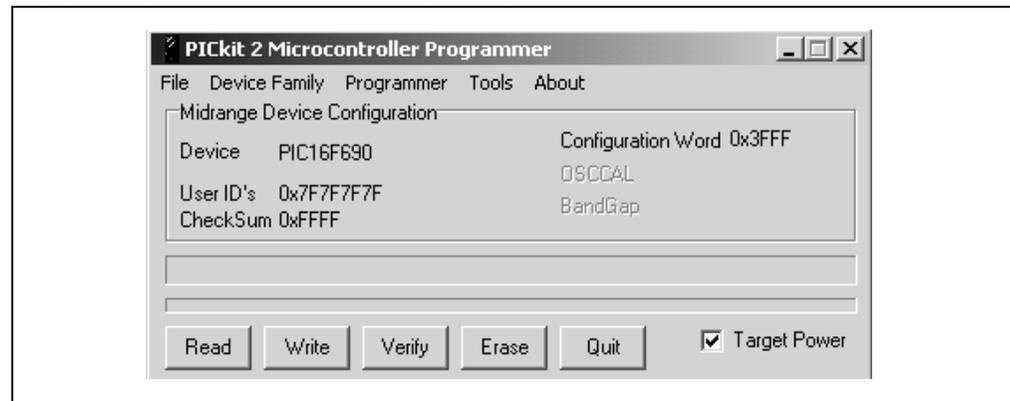
2.3.4   Import HEX File

To import a compiled program (hex file), select *File > Import HEX* as shown in Figure 2-6. Browse for the hex file and click **Open**. The code is displayed in the Program Memory and EE Data Memory windows. The name of the hex file is displayed in the Source block.

FIGURE 2-6:   IMPORT HEX FILE

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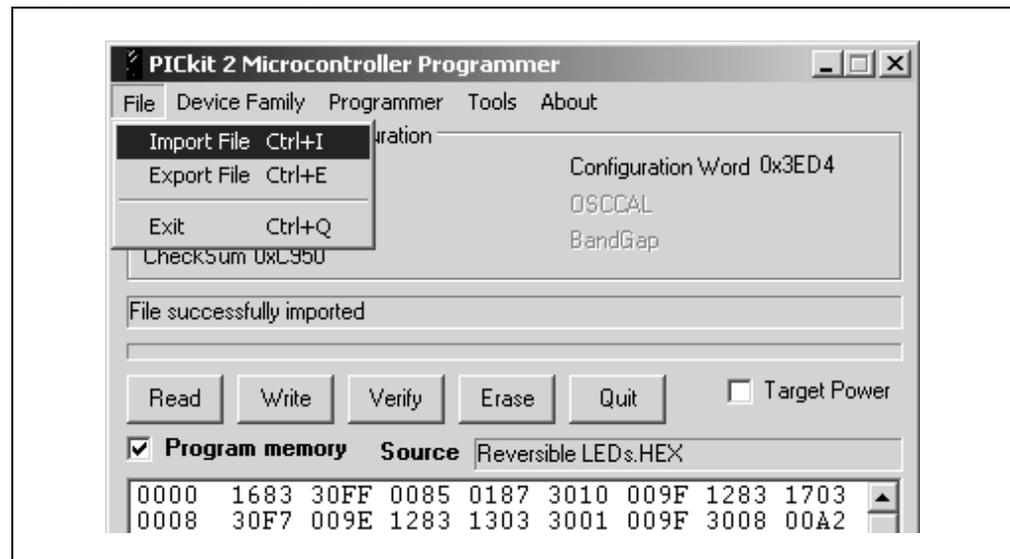
2.3.5 Write

After a device family has been selected and a hex file has been imported, the target PICmicro MCU can be programmed by clicking on the **Write** button. The PICmicro MCU will be erased and programmed with the hex code previously imported. The status of the Write operation is displayed in the status bar located under the Device Configuration window.

> **Note:** The device will be erased prior to programming. The PICkit 2 Microcontroller Programmer uses the bulk erase method that requires V$_{DD}$ voltage between 4.5 to 5.5V

If the write is successful, the status bar turns green and displays "Write Successful", as shown in Figure 2-7.

FIGURE 2-7:   WRITE SUCCESSFUL STATUS
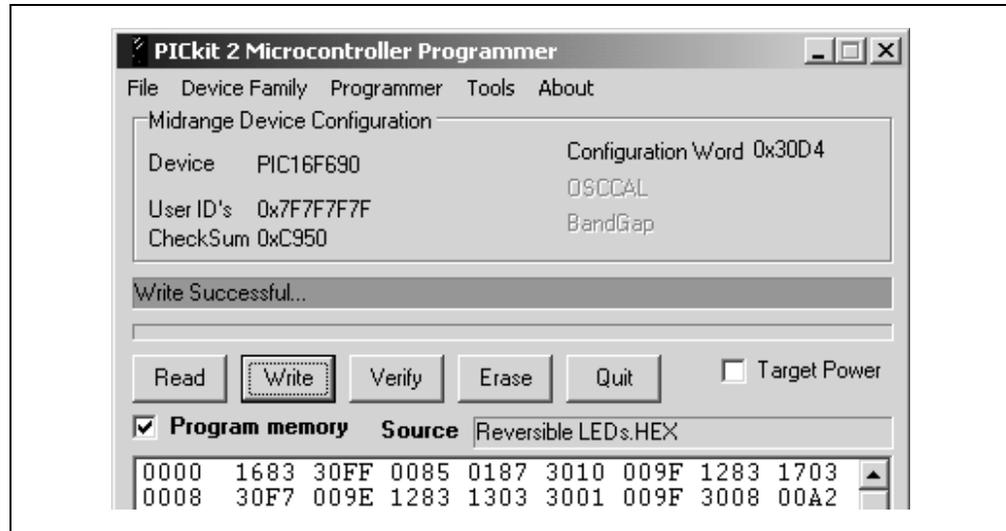
If the write fails, the status bar turns red and displays "Verify failed", as shown in Figure 2-8. This error indicates that the data was corrupted during the programming sequence. If this error is displayed, try writing the program to the device again. If the error continues, see **Chapter 5. "Troubleshooting"** for assistance.

FIGURE 2-8:   WRITE ERROR STATUS
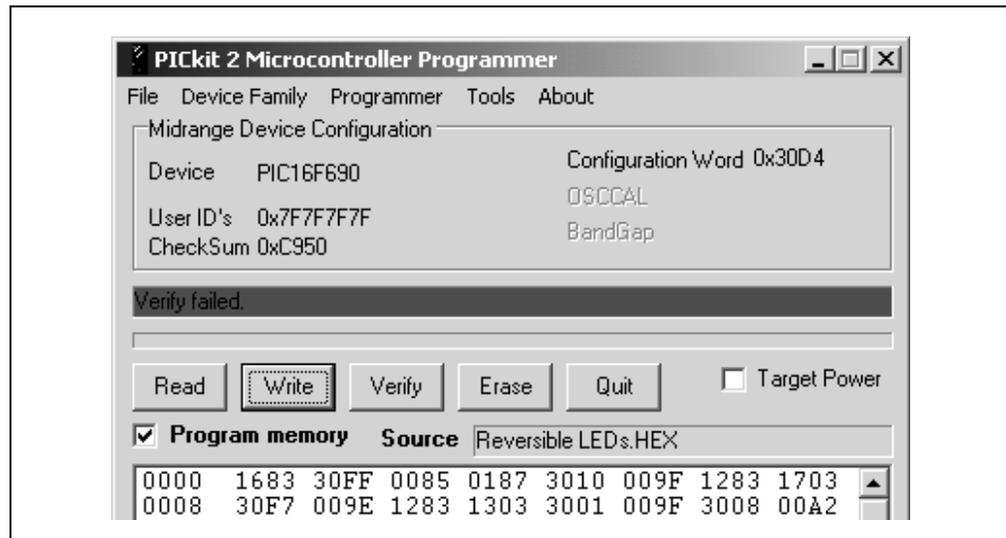
2.3.6 Automatic File Reload

Prior to each write, the imported hex file time stamp is compared to the version on the disk. If the version on the disk is newer, it is reloaded. This occurs only when a hex file has been read from the disk.

This feature ensures that the latest version built by MPLAB® IDE will be written to the device.

2.3.7 Verify

The Verify function verifies the device program to the imported hex file. It compares all areas of memory including program memory, data EEPROM memory, ID and configuration bits.

To verify the code, import the hex file and click the **Verify** button. If the code is the same, the status bar turns green and displays "Device Verified". If a discrepancy is found, the status bar turns red and displays where the error is located: "Error in Program Memory, Data EEPROM Memory, or Configuration Bits".

2.3.8 Read

To view the code written to the PICmicro MCU, click the **Read** button. The code is displayed in the Program and Data EEPROM Memory windows for your review. If all zeros are displayed, it is possible that the device is code-protected.

2.3.9 Code-Protect Device

The Code-Protect Device function enables the code protection features of the PICmicro MCU. To protect the code, complete the following steps:

1. Import hex file.
2. Select *Tools > Code Protect Device*, as shown in Figure 2-9.
3. Click Write.

FIGURE 2-9: ENABLE CODE PROTECT
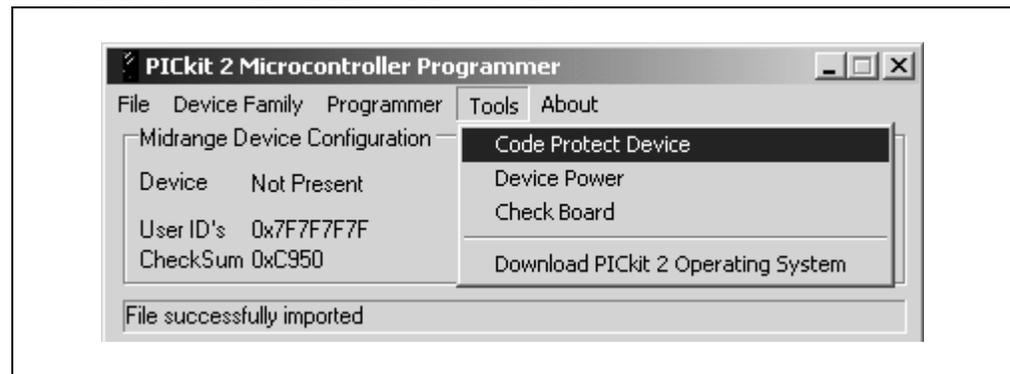
> **Note:** If the device is read after it has been code-protected, Program Memory and Data EEPROM Memory windows will display all zeros.

2.3.10   Erase

The Erase function erases the program memory, data EEPROM memory, ID and configuration bits. However, this function is not normally needed since the Write function performs an erase operation prior to programming the PICmicro MCU.

To erase the device, click the **Erase** button.

> **Note:** The PICkit 2 Microcontroller Programmer uses the bulk erase method that requires V$_{DD}$ voltage between 4.5 to 5.5V.

Chapter 3. PICkit™ 2 and ICSP™

3.1   INTRODUCTION

The PICkit™ 2 Microcontroller Programmer can program PICmicro® microcontrollers that are installed in an application circuit using In-Circuit Serial Programming™ (ICSP™). In-Circuit Serial Programming (ICSP) requires five signals:

- V_{PP} – Programming Voltage; when applied, the device goes into Programming mode.
- ICSPCLK or PGC – Programming Clock; a unidirectional synchronous serial clock line from the programmer to the target.
- ICSPDAT or PGD – Programming Data; a bidirectional synchronous serial data line.
- V_{DD} – Power Supply positive voltage.
- V_{SS} – Power Supply ground reference.

However, the application circuit must be designed to allow all the programming signals to be connected to the PICmicro device without distorting the programming signals. Figure 3-1 shows a typical circuit as a starting point when designing an application circuit for ICSP. For successful ICSP programming, the precautions in the following sections need to be followed.

> **Note:** For details on how a specific device is programmed, refer to the device programming specification available from the Microchip web site at www.microchip.com.

FIGURE 3-1:   **TYPICAL ICSP™ APPLICATION CIRCUIT**

PICkit™ 2 User's Guide
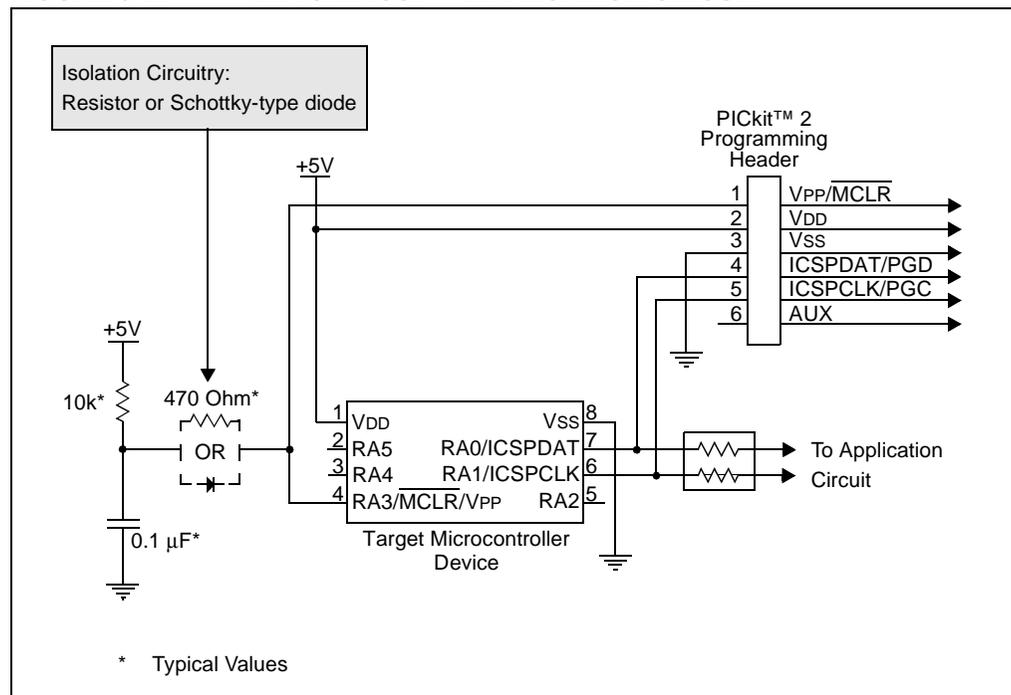
3.2   ISOLATE V$_{PP}$/$\overline{\text{MCLR}}$/PORT PIN

When V$_{PP}$ voltage is applied, the application circuit needs to take into consideration that the typical V$_{PP}$ voltage is +12V. This may be an issue in the following situations:

3.2.1   If the V$_{PP}$ pin is used as a $\overline{\text{MCLR}}$ pin.

The application circuit typically is connected to a pull-up resistor/capacitor circuit, as recommended in the device data sheet. Care must be taken so that the V$_{PP}$ voltage slew rate is not slowed down and exceeds the rise time in the programming specification (typically 1 μs).

If a supervisory circuit or a push button is interfaced to the $\overline{\text{MCLR}}$ pin, it is recommended that they be isolated from the V$_{PP}$ voltage by using a Schottky-type diode or limiting resistor as shown in Figure 3-1. For more information about using supervisory circuits with ICSP, see Application Note AN820 "*System Supervisors in ICSP™ Architectures*" (DS00820).

3.2.2   If the V$_{PP}$ pin is used as an I/O port pin.

The application circuit that connects to the I/O pin may not be able to handle the +12V voltage. It is recommended to use a Schottky-type diode or limiting resistor as shown in Figure 3-1 to isolate the circuitry.

3.3   ISOLATE ICSPCLK OR PGC AND ICSPDAT OR PGD PINS

The ICSPCLK or PGC and ICSPDAT or PGD pins need to be isolated from the application circuit to prevent the programming signals from being affected by the application circuitry. ICSPCLK or PGC is a unidirection synchronous serial programming clock line from the programmer to the target. ICSPDAT or PGD is a bidirectional synchronous serial programming data line.

If the design permits, dedicate these pins for ICSP. However, if the application circuit requires that these pins be used in the application circuit, design the circuitry in a manner that does not alter the signal level and slew rates. Isolation circuitry will vary according to the application. Figure 3-1 shows one possibility by using series resistors to isolate the ICSP signals from the application circuit.

3.4   VDD

During ICSP programming, the PICmicro MCU needs to be powered in accordance with the device specification. Typically, the PICmicro MCU supply voltage is connected to the application circuit supply voltage. The application circuit can be powered by the PICkit 2 Microcontroller Programmer or externally. There are a few precautions that need to be observed.

3.4.1   The application circuit is powered by the PICkit 2 Microcontroller Programmer.

The PICkit 2 Microcontroller Programmer supply voltage (VDD) is +5V. If the application circuit operates at a different voltage, isolation circuitry may be required so that the two voltage levels do not conflict.

CAUTION
The PICkit 2 Microcontroller Programmer supply voltage (VDD) is +5V.

CAUTION
The USB port current limit is set to 100 mA. If the target plus PICkit 2 Microcontroller Programmer exceeds this current limit, the USB port will turn off. The target may be powered externally if more power is required.

3.4.2   The application circuit is powered externally.

The PICkit 2 Microcontroller Programmer supply voltage (VDD) is +5V. If the application circuit operates at a different voltage, isolation circuitry may be required so that the two voltage levels do not conflict.

CAUTION
The PICkit 2 Microcontroller Programmer supply voltage (VDD) is +5V.

3.4.3   Bulk Erase is used.

Some PICmicro MCU devices use a bulk erase function to erase program memory, data EEPROM memory, ID locations, and configuration bits. Typically, the bulk erase function requires a supply voltage (VDD) of 4.5 to 5.5 Volts (refer to the device programming specification for device specific requirements).

This voltage range can be a problem if the application circuit is designed to operate at a different supply voltage range. In order to bulk erase the PICmicro MCU, the application circuit needs to take into consideration the bulk erase voltage requirement while protecting any voltage sensitive circuitry.

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3.5   Vss

The power supply ground reference, Vss, must be at the same potential as the application circuit.

3.6   OTHER CONSIDERATIONS

Minimize the distance the ICSP signals must travel by placing the ICSP connector as close to the application circuit PICmicro MCU as possible. Minimize any cable length between the PICkit 2 Microcontroller Programmer and application circuit PICmicro MCU. The goal is to keep the ICSP signals within the level and slew rate specifications for successful programming.

Chapter 4. Updating the PICkit™ 2 Operating System

4.1 INTRODUCTION

This chapter describes how to update the PICkit™ 2 Microcontroller Programmer's operating system.

4.2 UPDATING THE PICkit 2 MICROCONTROLLER PROGRAMMER

To update the PICkit 2 Microcontroller Programmer firmware Operating System, complete the following steps.

Step 1. Download the latest PICkit 2 Operating System from the Microchip web site at www.microchip.com.

Step 2. From the menu, select *Tools > Download PICKit 2 Operating System* as shown in Figure 4-1.

FIGURE 4-1: **DOWNLOAD PICkit 2 OPERATING SYSTEM**
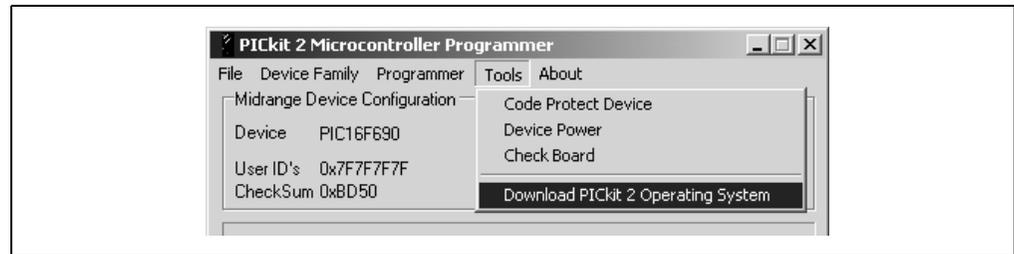
Step 3. Browse to the directory where the latest Operating System code was saved as shown in Figure 4-2.

Step 4. Select the PK2*.hex file and click on the **Open** button.

FIGURE 4-2: **SELECT PICkit 2 OPERATING SYSTEM**
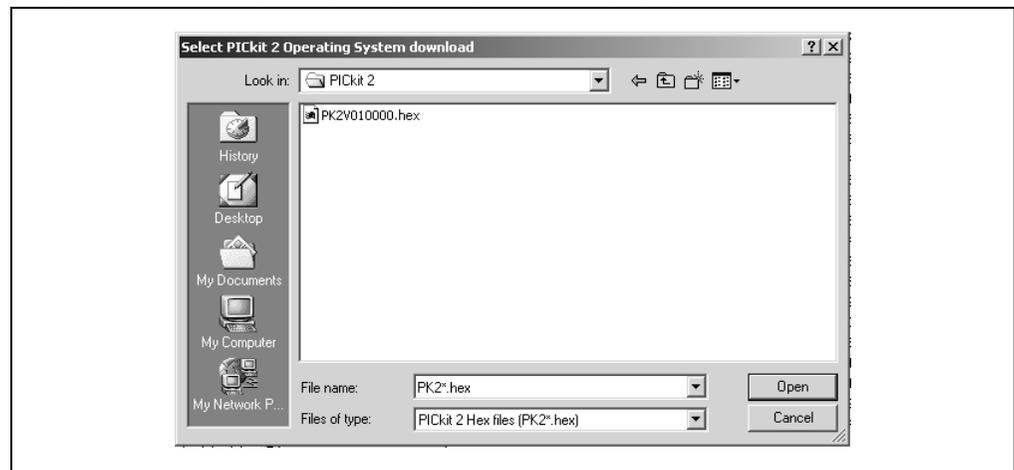
The progress of the OS update will be displayed in the status bar of the programming software and the Busy LED on the PICkit 2 Microcontroller Programmer will flash. When the update completes successfully, the status bar will display "Operating System Verified" and the Busy LED will go out. The operating system update is then complete.

NOTES:

Chapter 5. Troubleshooting

5.1 INTRODUCTION

This chapter describes questions and answers to common problems associated with using the PICkit™ 2 Microcontroller Programmer and how to resolve them.

5.2 FREQUENTLY ASKED QUESTIONS

Device is not recognized

<u>Question</u>

Why am I receiving an "*Insert Device*" message?

<u>Answer</u>

Verify that the device is supported and that the target MCU is connected to the PICkit™ 2 Microcontroller Programmer in accordance with **Chapter 3. "PICkit™ 2 and ICSP™"**.

Current Limit Exceeded

<u>Question</u>

Why am I receiving the error message "*USB Hub Current Limit Exceeded*" from the Microsoft® Windows® program?

<u>Answer</u>

Check for shorts on the circuit board.

Microsoft® Windows® Driver

<u>Question</u>

After plugging the PICkit™ 2 Microcontroller Programmer into the USB port, Windows® 98 SE asks for a driver. Where is the driver?

<u>Answer</u>

PICkit™ 2 Microcontroller Programmer uses the drivers included with Windows®. When Windows® 98 SE prompts for a driver, select "*Search for the best driver for your device.*" Then select the check box next to "*Microsoft Windows Update*" and click Next. Windows will automatically install the appropriate driver. Do not use Microchip's ICD 2 USB driver.

Verify and Read Return all Zeros

<u>Question</u>

When the **Verify** or **Read** buttons are clicked, the Program Memory window comes up with all zeros. What is wrong?

<u>Answer</u>

The device may be code-protected. Ensure code protection has not been selected in the Configuration Word.

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Microsoft® Windows® 95/98/NT

<u>Question</u>

Can I run on Windows® 95/98/NT?

<u>Answer</u>

No. These operating systems either do not support USB or have drivers that are not compatible.

Appendix 6. Hardware Schematics

6.1 INTRODUCTION

This appendix contains PICkit™ 2 Microcontroller Programmer schematic diagrams.

FIGURE 6-1: PICkit 2 SCHEMATIC DIAGRAM (PAGE 1 OF 2)
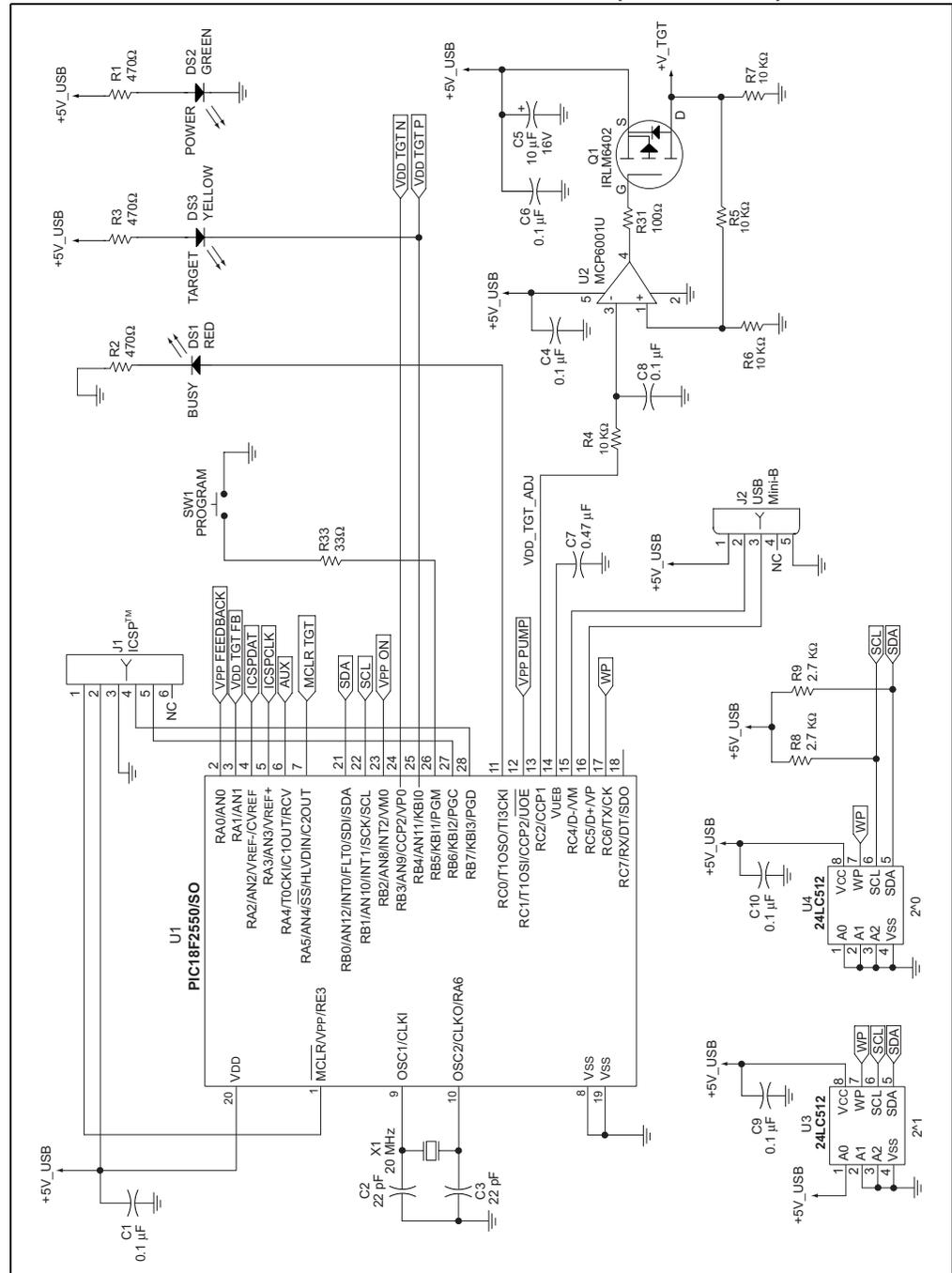
FIGURE 6-2: PICkit 2 SCHEMATIC DIAGRAM (PAGE 2 OF 2)
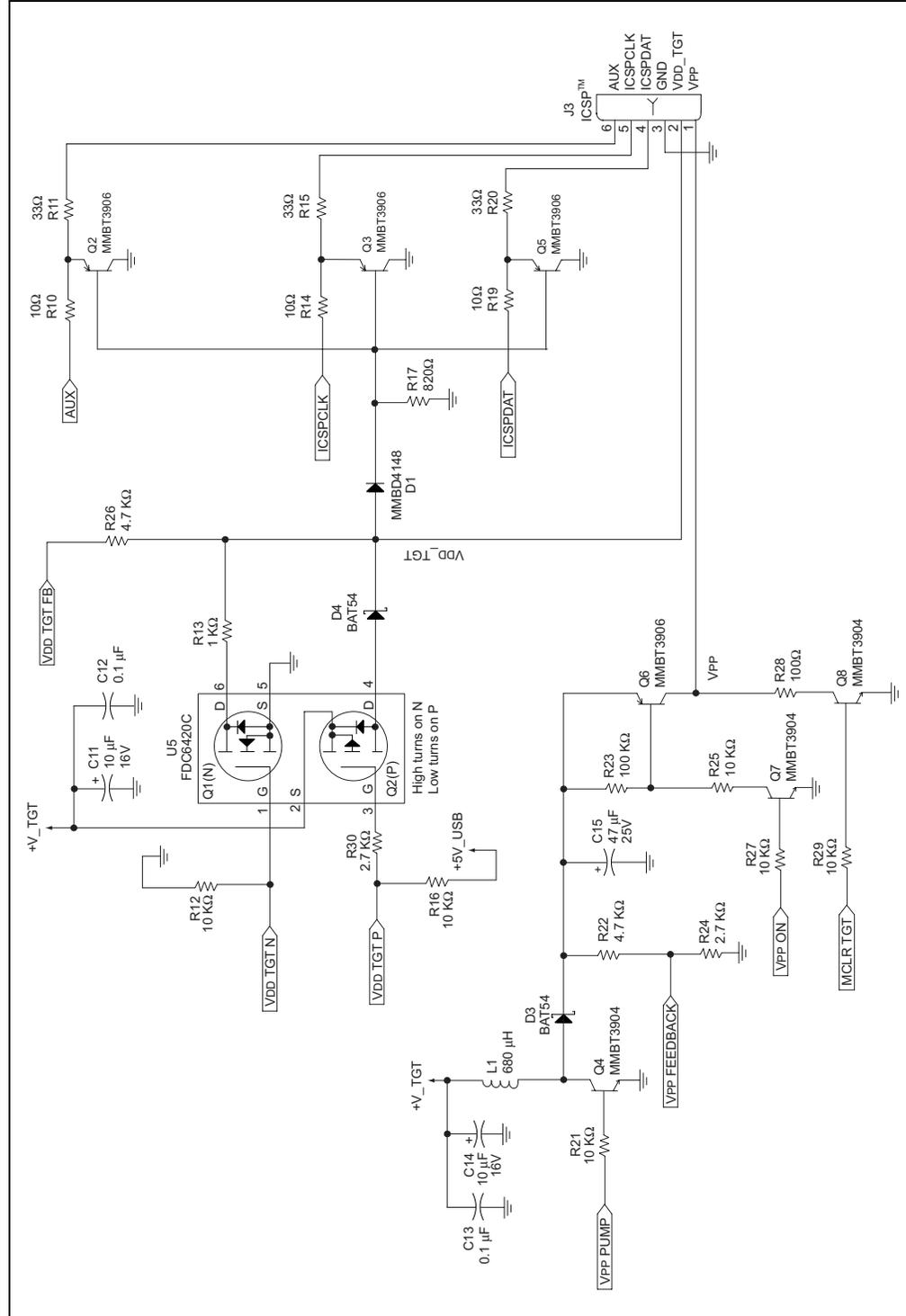
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