ICSP™ SOCKET MODULE USER'S GUIDE

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ICSP™ Socket Module User's Guide

Chapter 1. Introduction

1.1 WELCOME

Thank you for purchasing the ICSP™ Socket Module kit from Microchip Technology Incorporated.

The ICSP socket module is an extension of the PRO MATE® II device programmer that will allow the user to program Microchip PICmicro® microcontroller (MCU) devices when the devices are already installed in the target board.

1.2 THEORY OF OPERATION

The ICSP socket module will boost the output current of the PRO MATE II to provide power to the target board where the PICmicro MCU is installed. This is accomplished by using an external power supply and circuitry on the module itself.

By using the ICSP socket module with PRO MATE II, the PICmicro MCU is programmed and verified using the proper algorithm for production programming. Please refer to the desired device programming specification (see Section 1.4.)

The socket module is protected from over current conditions on the target board by current limit circuitry. An over current condition is indicated by red LED's on the socket module.

1.3 KIT CONTENTS

The ICSP Socket Module package contains the ICSP Socket Module, a +15V current boost power supply, target interface cables and documentation.

The documentation package consists of:

- ICSP Socket Module User's Guide (this document)
- ICSP Guide, which is a document that explains ICSP programming, and how to implement ICSP in the target application to ensure reliable programming results
- Packing list
- Important information sheet

1.4 SUPPORTING DOCUMENTATION

This document describes how to use the ICSP socket module with PRO MATE II. For more information on ICSP usage, the following documents are recommended reading.

README for PRO MATE II

For the latest information on using PRO MATE II, read the README for PRO MATE II file (an ASCII text file) in the MPLAB® IDE directory. For MPLAB IDE v5.xx, the README file is named `readme.pro`. For MPLAB IDE v6.xx, the README file is named `Readme for PRO MATE II.txt`. The README file contains the most up-to-date information and known issues on PRO MATE II.

Programming Specifications

For information on how to program a specific device using ICSP, consult the programming specification for that device. See the README for PRO MATE II for a list of programming specifications of supported devices. Programming specifications may also be found on the Microchip website at www.microchip.com.

Using the ICSP Socket Module with PRO MATE II (DS51243)

This poster contains helpful information on installing and using the ICSP socket module with PRO MATE II.

In-Circuit Serial Programming (ICSP) Guide (DS30277)

This document contains helpful design guidelines to follow for successful ICSP programming. It includes application notes on hardware designs and the ICSP programming specifications.

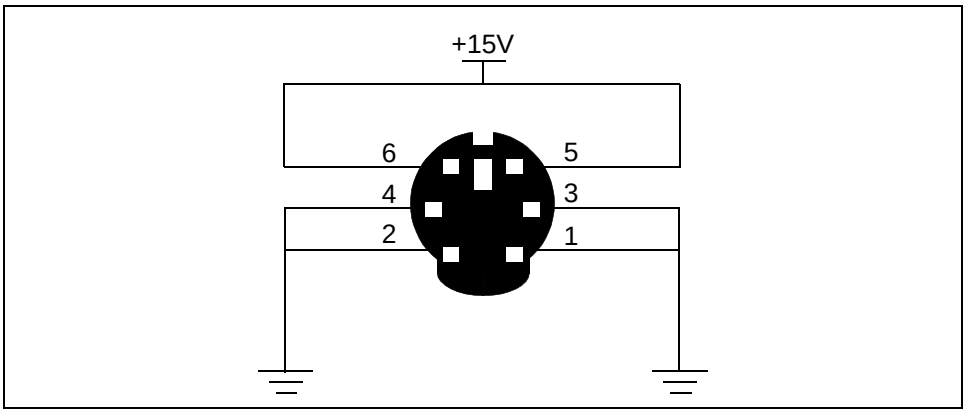
PRO MATE II User's Guide (DS30082)

A document describing how to use PRO MATE II programmer. Gives a system description, explains how to install necessary hardware and software, shows how to set up PRO MATE II to be used with MPLAB IDE, PROCMD or stand-alone. Also gives examples of use.

Chapter 2. Hardware

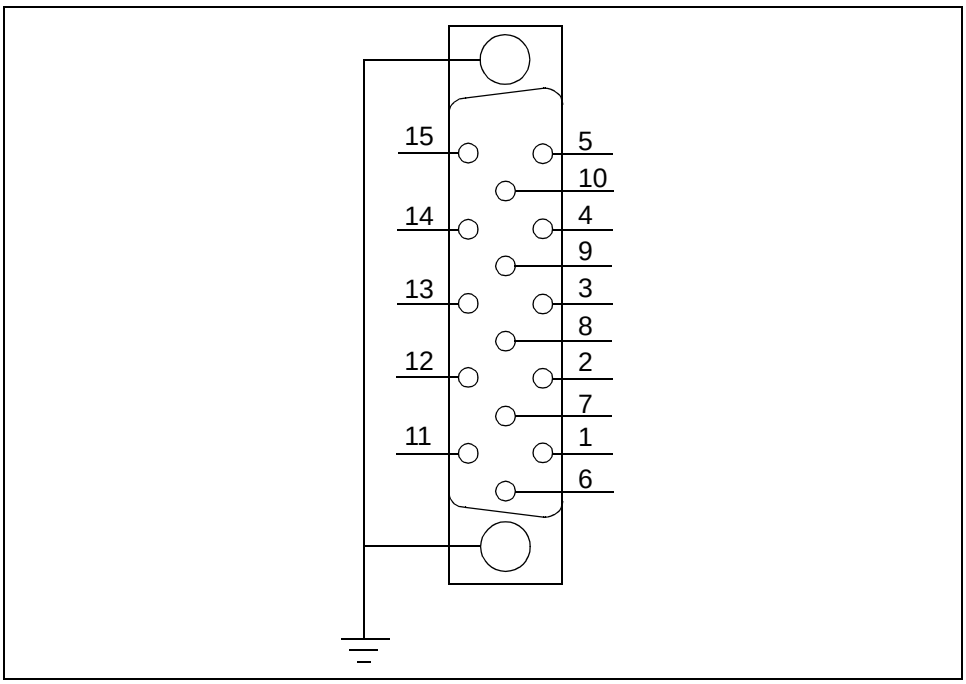
2.1 CONNECTORS

The ICSP Socket Module has connectors for the current boost power supply and the interface cable. The connection to the power supply is as follows:



2.2 CABLES

The 15 pin D-Sub connector provides the signals for programming and has connections and pin functions as follows:



Pin1:	Buffered Clock for programming PIC17C75X devices
Pin2:	Low Voltage programming pin for PIC16F87X devices
Pin3:	Reserved
Pin4:	$\overline{GO}$ indication from target board
Pin5:	Buffered programming clock signal (RB6;S2 on HCS devices)
Pin6:	GND
Pin7:	GND
Pin8:	Reserved
Pin9:	TEST signal used with PIC17C75X devices
Pin10:	Buffered programming data signal (RB7;PWM/DATA on HSC devices)
Pin11:	V_{DD} to target board
Pin12:	Fail Indicator
Pin13:	Pass Indicator
Pin14:	+5 volts from socket module
Pin15:	V_{PP} to target board

2.3 SWITCHES

On the bottom of the socket module there is a four position mini-dip switch. This switch is used to configure the socket module for the desired PICmicro MCU device. Refer to the README for PRO MATE II text file in the MPLAB IDE install directory for the most up-to-date list of supported devices and proper switch settings.

The switches must be set prior to installing the socket module and the PRO MATE II power must be OFF when the socket module is removed or installed.

2.4 ELECTRICAL SPECIFICATIONS

Voltage Input Requirements:

Voltage input is +15 volts, 750 mA.

Voltage/Current Output Limits:

Voltage output will be limited to the programming specification for each device. Absolute limits are V_{DD} = 2.5 - 6.5 volts and V_{PP} = 3.0 - 14.0 volts.

Output drive currents: 400 mA on V_{DD}, and 100 mA on V_{PP}.

$\overline{GO}$ Signal Requirements:

Input must be able to sink 5 mA for the signal to be recognized.

PASS/FAIL Signal Output Limits:

Output limits are target V_{DD} voltage through a 1 Kohm resistor. This is designed to drive the base of a transistor for signal switching.

+5 Volt from Interface:

The +5 volt from the interface cable will supply 100 mA of current and is a good source to light PASS/FAIL LED's.

Chapter 3. Features

3.1 AUTO DETECTION

The PRO MATE II will automatically detect that the ICSP Socket Module is installed during the power on self check.

Note: The 15 volt power supply must be connected and plugged in prior to turning on the PRO MATE II or a power on self test failure will occur.

Once the device has been selected, the word ICSP will be displayed to the right of the PICmicro MCU device on the LCD display. This is the indication that the PRO MATE II has identified the ICSP Socket Module and will interact with the module properly. If the word ICSP does not display, the module will not operate properly, and the PRO MATE II should be shut off and the power up sequence repeated.

The proper power up sequence is:

- Configure switches
- Install module
- Connect 15V power
- Turn on PRO MATE II
- Select device
- Connect interface cable

As part of the power on self check, there is a test to make sure the ICSP socket module is properly connected. "Tighten Top" will be displayed if the ICSP socket module is not making a good connection. The top fastener should be tightened until the message goes away.

3.2 $\overline{\text{GO}}$ SIGNAL

PRO MATE II will respond to the $\overline{\text{GO}}$ signal and begin a programming cycle as if the user had pressed the PGM button on the PRO MATE II.

The $\overline{\text{GO}}$ signal is an active low signal. When the PRO MATE II detects that the $\overline{\text{GO}}$ signal is low, it will begin the programming sequence.

The PRO MATE II will wait in the PASS/FAIL mode until the $\overline{\text{GO}}$ pin is inactive.

3.3 PASS/FAIL INDICATIONS

After programming is complete, the PRO MATE II will either drive the PASS or FAIL signals high to indicate the results of the programming operation. These signals will remain active as long as the $\overline{\text{GO}}$ signal is low. If the $\overline{\text{GO}}$ signal has been removed prior to the end of the programming cycle, the PASS/FAIL indicators will remain active for approximately 1 second.

3.4 OVER CURRENT INDICATORS

There are two indicators on the ICSP Socket Module that will show when the V_{DD} or the V_{PP} is in an over current situation. During the programming cycle, if either of the Over Current LED's is on, there is a problem with the respective voltage and the target board should be checked. The PRO MATE II will wait approximately 2-3 seconds for voltages to become stable (to allow for large capacitance on target board) before resetting to the idle state.

After an over current condition occurs, there should be a minimum of 30 seconds delay prior to executing the next programming cycle for the over current status to be reset.

3.5 LOW VOLTAGE PROGRAMMING

PRO MATE II allows programming of PIC16F87X parts using the low voltage programming mode with the ICSP socket module. Upon selection of the part, you must press either the YES or NO button to indicate whether you want to use Low Voltage Programming. If you answer YES, then when the device is displayed on the LCD, you will see "LV" after ICSP (following the part name). You must ensure that the device has the Low Voltage Program configuration bit set to "enabled" or you will not be able to access the part. This is only available when the ICSP socket module is used.

If you answer NO to the question, then the part will use the normal high voltage on MCLR to program the device. If you do not answer the question prior to enabling PRO MATE II when using MPLAB IDE, you will get a communication error, since the only place to enter Low Voltage Programming mode is from the buttons on PRO MATE II.

The low voltage programming pin (RB3) needs to be connected to Pin 2 of the 15 Pin connector on the ICSP socket module. This is in addition to the other required pins (RB6, RB7, V_{DD}, V_{SS}.) You must still connect the V_{PP} line to the $\overline{MCLR}$ pin but the voltage will not exceed V_{DD}.

3.6 TYPICAL APPLICATION

A typical application for the ICSP module would be to connect a handler to a target board during the production run. This handler would connect the required signals (V_{PP}, V_{DD}, Gnd, Clock Data) to the target board. The handler could also provide the interface to the PRO MATE II through the $\overline{GO}$ and PASS/FAIL signals.

When the handler is properly connected to the target board, the $\overline{GO}$ signal would be driven low and held in the low state during the programming process. Once the programming process is complete, the PRO MATE II will drive either the PASS or FAIL lines high to indicate the outcome of the programming process. The handler would then respond to the PASS/FAIL as appropriate and release the $\overline{GO}$ signal to allow the next board to be programmed.

Target design methods are discussed in the *In-Circuit Serial Programming Guide* and should be referenced prior to design to ensure that the target board can be properly programmed using ICSP.

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