

# MPLAB<sup>®</sup> PM3 ICSP<sup>™</sup> Design Guide

## ICSP<sup>™</sup> Implementation Considerations

The MPLAB<sup>®</sup> PM3 Device Programmer allows programming of PICmicro<sup>®</sup> microcontrollers that are already installed in a target board using ICSP (In-Circuit Serial Programming). However, the application circuit must be designed to allow all the programming signals to be directly connected to the PICmicro device and must compensate for the following issues. Figure 1 shows a typical circuit as a starting point when designing an application circuit for ICSP.

### ISOLATE MCLR/VPP PIN

When the MCLR/VPP pin is connected to an RC circuit, the operation of ICSP is affected by the size of the capacitive load. It is recommended that you use a resistor or Schottky-type diode to isolate the RC circuit from the programmer. If the application circuit cannot isolate the RC circuit in this way, a series resistor up to 100 Ohm may be used to help prevent overshoot caused by the application circuit. In addition, if an external reset device is connected to MCLR, it must be isolated from the voltage applied by the programmer to this pin during programming. Typically, a series resistor between MCLR and the external reset device is used to limit the current to safe levels. See Application Note AN820 for more details on this topic.

### ISOLATE PGC/PGD/PGM PINS

Pins RB6/PGC and RB7/PGD must be isolated from the application circuit to prevent the programming signals from being affected by the application circuitry. This isolation circuit must account for RB6/PGC and RB5/PGM being inputs on the PICmicro device and for RB7/PGD being bidirectional (can be driven by both the PICmicro device and the programmer). If the design permits, these pins should NOT be used by the applications. Consider what type of circuitry is connected to RB6/PGC, RB7/PGD and RB5/PGM and decide on how to isolate these pins. Figure 1 shows typical circuitry. It does not show any circuitry to isolate RB6/PGC, RB7/PGD and RB5/PGM on the application circuit as this is application dependent.

### VDD

Typical circuits use several hundred microfarads of capacitance on VDD to help damp noise and ripple. However, this capacitance requires a fairly strong driver in the programmer to meet the rise rate timings for VDD. If an application circuit requires more power than the MPLAB PM3 programmer can supply, the application circuit may need to power itself. Refer to the MPLAB PM3 on-line help for further details.

### VDD-ONLY (NON-HIGH VOLTAGE) PROGRAMMING

When using VDD-only ICSP mode, care must be taken to ensure RB5/PGM does not float high during power-on. Therefore, it is recommended that RB5/PGM be tied to system ground through a 10K resistor and that RB5/PGM is not used for the application circuit.

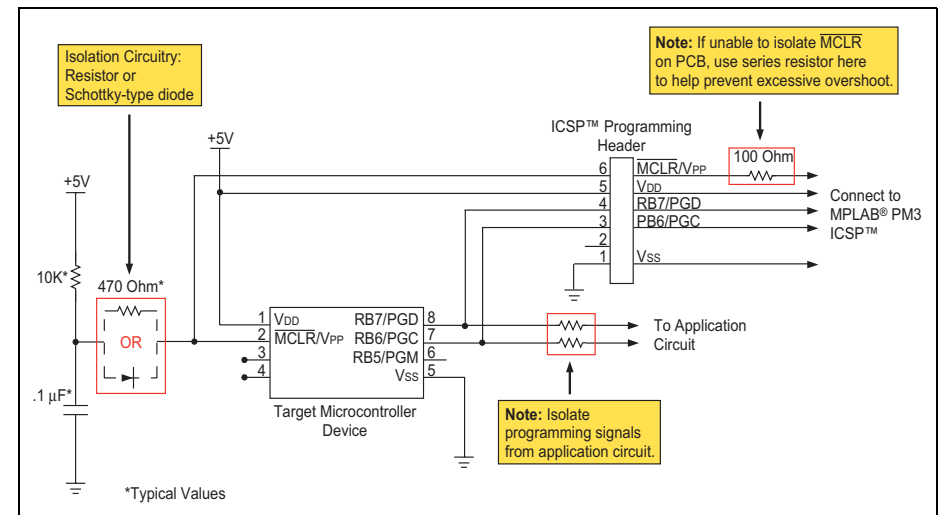


FIGURE 1: TYPICAL ICSP APPLICATION CIRCUIT

### GND

The MPLAB PM3 must be at the same ground potential as the application circuit.

### ADDITIONAL SYSTEM CONCERNS

Some Microchip programming specifications require the device to be programmed at 5V. If an application circuit operates at 3V only, special considerations must be made, such as totally isolating the PICmicro device during programming.

### PROGRAMMING ENVIRONMENT

Physical distance between the programmer and the application circuit affects the load capacitance on each of the programming signals. Therefore, the cable length must be kept as short as possible and properly terminated and shielded. Otherwise, the programming signals may be corrupted by ringing or noise.

### FINAL NOTE

If programming problems exist once the application circuit is designed, verify that all programming signals meet the programming specification rise times and voltage levels.

