MPLAB® ICD 2 DESIGN ADVISORY

Operational Issues

When designing applications that use the MPLAB® ICD 2, the following operational issues should be considered:

- AC Grounding
- Oscillator Circuit Setup
- USB Driver Enumeration
- Proper USB Connection to Avoid Latch-Up
- Hibernation
- Correcting Crosstalk – dsPIC® DSCs
- MPLAB ICD 2 Unit Upgrade

Refer to the *MPLAB® ICD 2 In-Circuit Debugger User's Guide* (DS51331) for general operational information.

AC GROUNDING

The MPLAB ICD 2 must be isolated from an application target utilizing AC line power with no isolation. Carefully consider the ground and signal return connections and their differing voltage potentials before connecting the MPLAB ICD 2 to the target.

The MPLAB ICD 2 connects to earth ground from the USB connector interface through the PC and from the external brick power supply connector. For non-isolated AC line power applications, system interfaces must float and not be referenced to ground to prevent damaging the MPLAB ICD 2 once it's connected to the target. This means the MPLAB ICD 2 must be referenced to the same ground potential as the target.

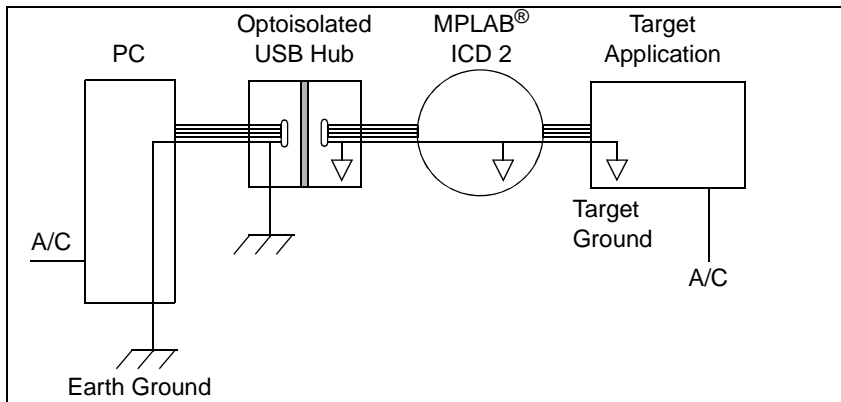# MPLAB® ICD 2 Design Advisory

WARNING
Using the MPLAB ICD 2 without ensuring ground isolation will result in damage to the MPLAB ICD 2 or the target system as the full AC mains voltage will be applied. This condition can be hazardous to the operator in the form of an electric shock, therefore, take adequate precautions to avoid this situation.

For these applications, an optoisolated hub should be used between the PC and the MPLAB ICD 2 to provide isolation from the PC's earth ground through the USB cable. Do not use the MPLAB ICD 2 external power supply. This configuration is shown in Figure 1-1.

FIGURE 1-1:   EXAMPLE MPLAB® ICD 2 SETUP FOR NON-ISOLATED AC POWER SYSTEMS

If power is supplied to the target application, an external power supply is not needed on the MPLAB ICD 2. In MPLAB IDE, select either *Debugger>Settings* or *Programmer>Settings* and click on the **Power** tab. Uncheck the "Power target circuit from MPLAB ICD 2 (5V VDD)" checkbox.

Operational Issues

OSCILLATOR CIRCUIT SETUP

Primary Oscillator

For a new project with the debugger set to MPLAB ICD 2, when a function is selected from the Debugger menu, the system may display a message, "Will not enter debug mode" in the output window. This is the result of an oscillator configuration mismatch between the target hardware setup and the default Configuration bits in MPLAB IDE. To correct this, set the Configuration bits to match the oscillator settings of the target configuration.

Timer Oscillator or Secondary Oscillator

If the MPLAB ICD 2 header board is used to connect to the target, there may be problems with starting up the 32 kHz crystal resonator. To avoid potential problems, consider the following:

1. Ensure the 32 kHz crystal is connected near the device footprint.
2. Keep all lines as short as possible in the target application without unnecessary discontinuities such as PCB vias and test points.
3. Minimize any capacitive loading on these nodes.
4. Avoid using a socket for the placement of the crystal and capacitor. Solder the devices directly to PCB pads.

USB DRIVER ENUMERATION

Anytime a USB cable is connected to the MPLAB ICD 2, there is a short time before the USB subsystem becomes ready. This time is referred to as enumeration. Due to the USB component used in the MPLAB ICD 2, this time differs depending on the operating system being used but is generally less than 30 seconds.

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After connecting the USB cable to the MPLAB ICD 2, allow the USB subsystem to enumerate before invoking the MPLAB IDE software. To view this process, open the Device Manager window while connecting the USB cable. The window output will display the firmware loader momentarily, followed by the firmware client "Microchip MPLAB ICD 2 Firmware Client".

PROPER USB CONNECTION TO AVOID LATCH-UP

Always connect a powered USB cable to the MPLAB ICD 2 first before connecting any other power source, either directly to the ICD pod or indirectly through a connection to the target board. Also, when powering down, make sure the USB cable maintains power until all other power sources are removed, i.e., **do not** power down the PC first and then the ICD pod and/or target board.

If MPLAB ICD 2 loses USB power while other sources continue to deliver power to the ICD pod, the MPLAB ICD 2 can lock up and may require a complete system (MPLAB ICD 2 and target board) power down and then power up to make the ICD functional again. Some older pods may suffer permanent damage.

If you have followed these instructions but still have latch-up problems, please see "MPLAB ICD 2 Unit Upgrade".

HIBERNATION

When using the MPLAB ICD 2 for prolonged periods of time, and especially while the ICD is in emulation mode, be sure to disable the Hibernate mode in the Power Options Dialog window of the operating system. Go to the **Hibernate** tab and clear or uncheck the "Enable hibernation" check box. This will ensure that all communication is maintained across all the USB subsystem components.
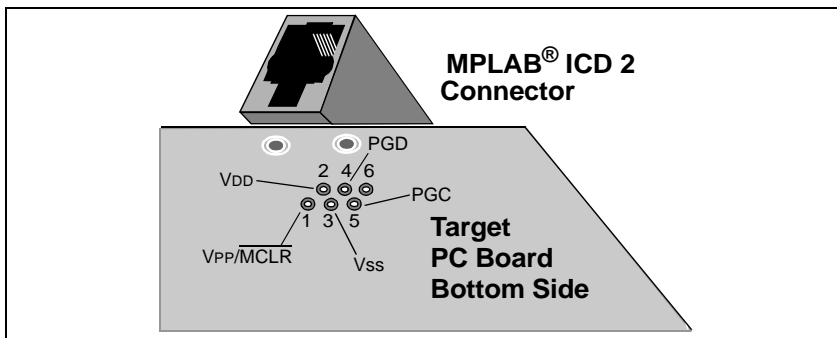
CORRECTING CROSSTALK – dsPIC® DSCs

In some cases, depending on the revision of the MPLAB ICD 2 and the dsPIC30 DSC device, a crosstalk problem may exist when the device is being programmed. Due to the locations of the PGC and PGD pins, crosstalk may degrade the signal and cause the MPLAB ICD 2 to fail programming of the target device. To correct this, try the following:

1. Construct a RJ12 modular cable and replace the 15-inch cable that comes with the MPLAB ICD 2. Keep the length as short as possible, preferably under 6 inches. Also, remove the jacket from the cable, so that the conductors are far apart from each other (especially the PGC and PGD signals). The standard MPLAB ICD 2 modular cable is wired as shown in Figure 1-2, that is, RJ12 pin 1 on one end connects to RJ12 pin 6 on the other end. This solves the problem in nearly all cases.

FIGURE 1-2:

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2. If the problem persists, please see "MPLAB ICD 2 Unit Upgrade".

> **Note 1:** Noise-inducing equipment (motors, light dimmers, etc.) must be on separate power strips from the target application and the MPLAB ICD 2.
>
> **2:** The use of any cable (other material, length, etc.) other than the one provided with the MPLAB ICD 2 may result in unreliable device behavior.

MPLAB ICD 2 UNIT UPGRADE

If you are having problems with ICD operation, please check the revision of your pod, found on the back of the unit. If the part number is 10-00319 R15 through R21 without an "ECO 3013" sticker, please contact your local Microchip FAE or sales office to return the unit for replacement.

Operational Issues

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