
**Getting Started with 32-bit Microcontroller Curiosity Pro/
Ultra Evaluation Kits**

Abstract

This document aims at getting started with any SAM or PIC32 microcontroller and its associated Curiosity Pro/Ultra evaluation kit.

The evaluation kits are supported by the MPLAB® X Integrated Development Environment and provide an easy access to the features of the microcontrollers.

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1. Obtaining a Curiosity Pro/Ultra Evaluation Kit

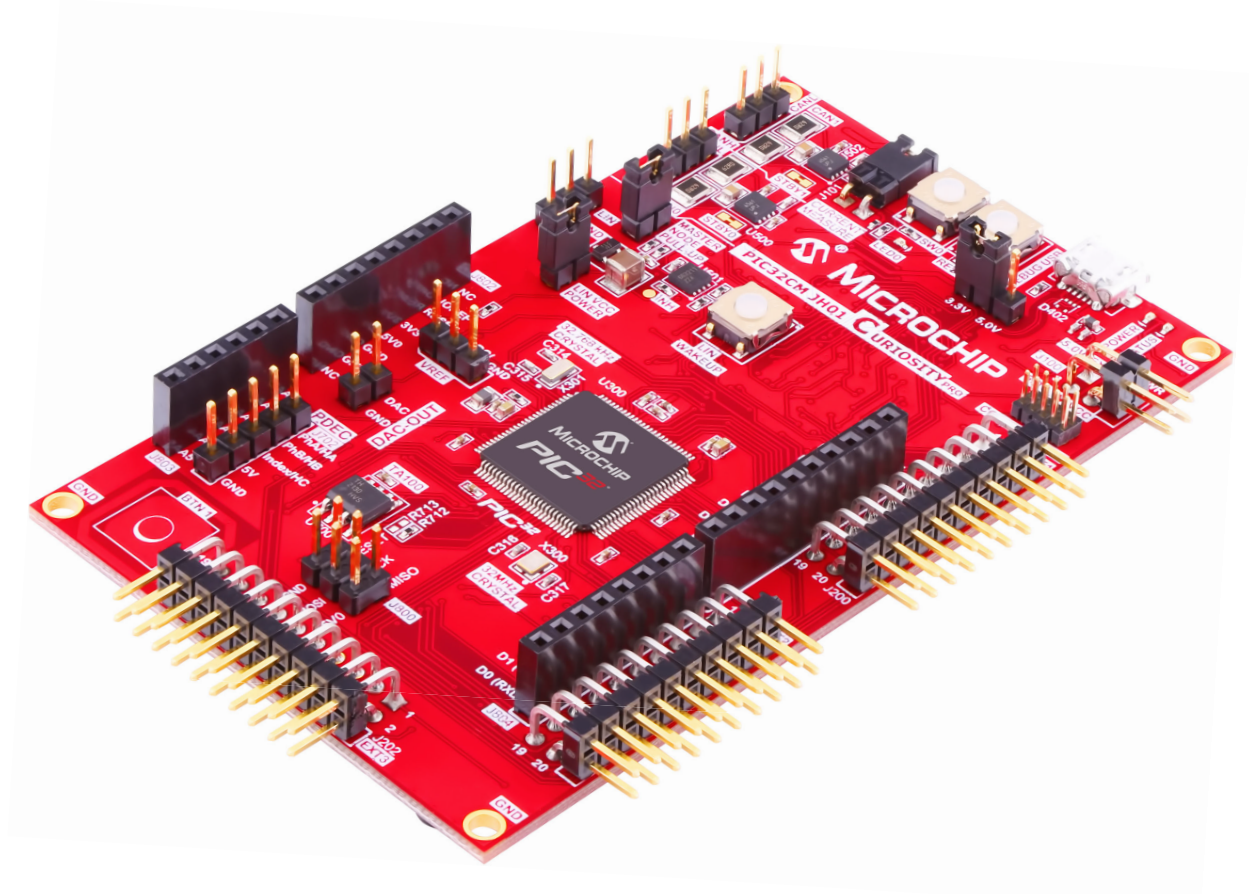
The Curiosity Pro/Ultra evaluation kits are hardware platforms for evaluating the Microchip SAM/PIC32 microcontrollers (MCUs). Each evaluation kit is supported by the MPLAB X IDE and MPLAB Harmony v3, featuring application examples.

The Curiosity Pro/Ultra evaluation kits include an on-board embedded debugger to program or debug the target microcontroller. This enables an easy start to a project, and provides application examples that can be used in the design of a custom application.

The Curiosity Pro/Ultra evaluation kits provide easy access to the features of the microcontroller, and are integrated with Arduino Uno, mikroBUS™, and extension headers to interface with Xplained Pro extension boards for a rapid prototyping and expanded functionality.

The Curiosity Pro/Ultra evaluation kits can be purchased at [Microchip Direct](#).

Figure 1-1. Curiosity Pro/Ultra Evaluation Kit (PIC32CM JH01 Example)



2. Tools and Software

2.1 MPLAB X Integrated Development Environment

The MPLAB X Integrated Development Environment (IDE) is an expandable, highly configurable software program that incorporates powerful tools to discover, configure, develop, debug, and qualify embedded designs for most of the Microchip's microcontrollers and digital signals controllers. MPLAB X IDE works seamlessly with the MPLAB development ecosystem of software and tools.

Figure 2-1. MPLAB X IDE Icon



Users can download MPLAB X IDE from the Microchip's website: www.microchip.com/mplab/mplab-x-ide.

Installing the Device Family Packs (DFP)

Follow these steps to install the DFP:

1. Open MPLAB X IDE.
2. From the Toolbar, select *Tools > Packs*.
3. Enter the microcontroller's name in the DFP search box, and then install the latest DFP available.

2.2 MPLAB Code Configurator

The MPLAB Code Configurator (MCC) is a free graphical programming environment that generates seamless, easy-to-understand 'C' code to insert into projects. Using an intuitive interface, MCC enables and configures a rich set of peripherals and functions. MCC supports 8-bit, 16-bit, 32-bit PIC®, and SAM® microcontrollers. MCC is incorporated into MPLAB X IDE as a plugin.

Figure 2-2. MPLAB Code Configurator Icon

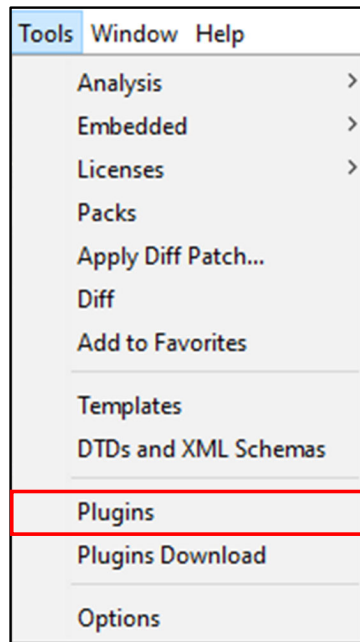


Installing MCC from MPLAB X IDE

Follow these steps to install MCC from MPLAB X IDE:

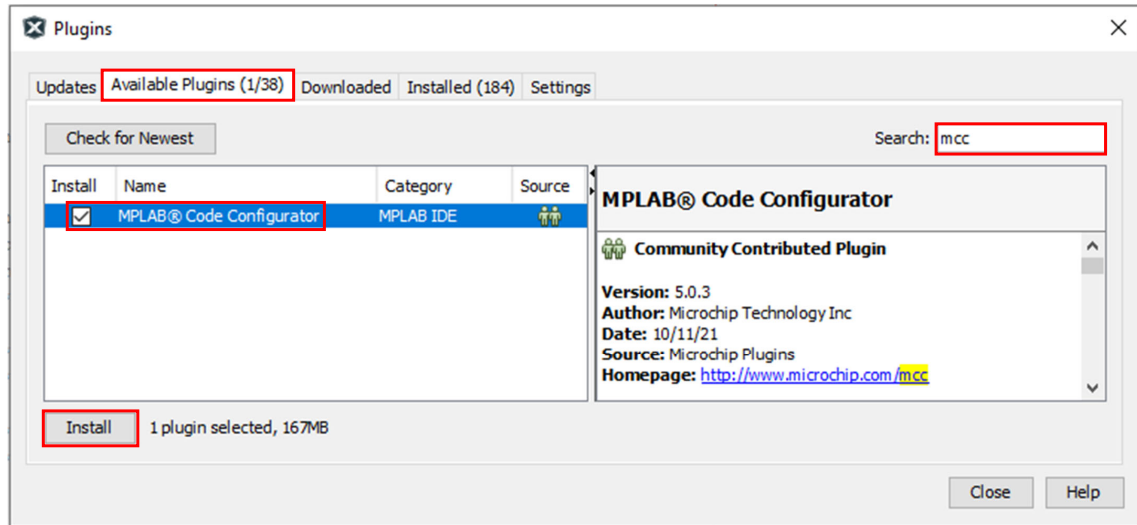
1. From the Toolbar, select *Tools > Plugins*.

Figure 2-3. MPLAB X IDE Plugins Tool



2. In the Plugins window, click the **Available Plugins** tab and type MCC in the search box. The MCC plugin details will be displayed (if not yet installed) as shown in the following figure.
3. Select the check box next to the MCC plugin, and then click **Install**.

Figure 2-4. MPLAB Code Configurator Installation from MPLAB X IDE Plugins



4. In the Plugin Installer window, follow the instructions. Select **Restart Now**, and click **Finish** when installation is completed.
5. MPLAB X IDE will restart with the MCC plugin installed.

2.3 MPLAB Harmony v3

MPLAB Harmony v3 is a fully integrated embedded software development framework that provides flexible and interoperable software modules to simplify the development of value-added features, and reduce the customer's time to market (TTM).

Figure 2-5. MPLAB Harmony v3 Icon



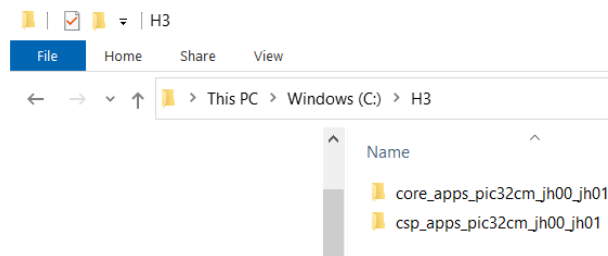
Go to the Microchip GitHub page, <https://github.com/Microchip-MPLAB-Harmony>, to download the matching application packages:

- `csp_apps_XXXX`: Contains the driver, FS, system service, and RTOS application examples.
- `core_apps_XXXX`: Contains the Peripheral Library (PLIB) application examples.

Note: Users can download specific examples from the Microchip website: <https://mplab-discover.microchip.com/>.

Create a folder and name it as `C:\H3`, which is used as the MPLAB Harmony v3 framework folder. Unzip application packages files in this folder as shown in the following figure:

Figure 2-6. Application Packages Unzipped in Harmony v3 Framework

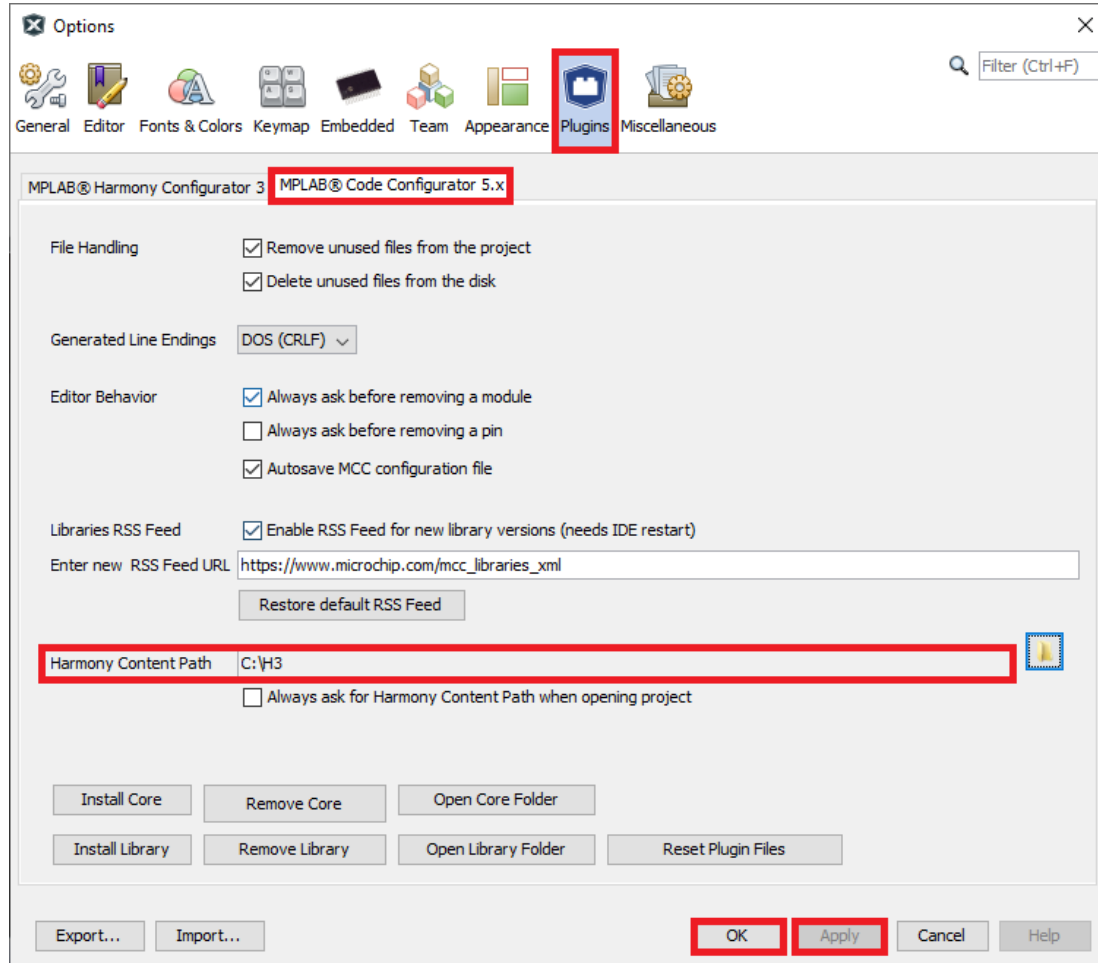


Note: The MCC's Content Manager can then be used to update the MPLAB Harmony v3 framework folder or download new packages.

Follow these steps to define the MPLAB Harmony v3 framework folder in MPLAB X IDE:

1. From the Toolbar, select *Options > Plugins*.
2. For MPLAB Harmony Configurator v3, choose MPLAB Code Configurator 5.x.
3. For MPLAB Harmony Content Path, choose newly created H3 folder as shown below.

Figure 2-7. MCC Harmony Content Path Update



Note: This step is optional for running an application only, but it must be verified to run the MCC plugin.

Users can define another path and name for the MPLAB Harmony v3 Framework folder, but must ensure to define them as small as possible for tool restrictions.

Note: The C:\H3 folder will be referenced in this document, from this point forward.

4. Click **Apply**, and then click **OK**.

2.4 MPLAB Discover

MPLAB Discover is a catalog of fully configured and complete source codes, projects, examples and software applications for PIC® and AVR® microcontrollers to help jump-start next customer project. It features intuitive and powerful search capabilities to search for content quickly and easily.

Figure 2-8. MPLAB Discover Icon



For additional information about MPLAB Discover, go to Microchip website: mplab-discover.microchip.com/.

3. Getting Started with any PIC32 or SAM Microcontroller Using the MPLAB X IDE and MCC

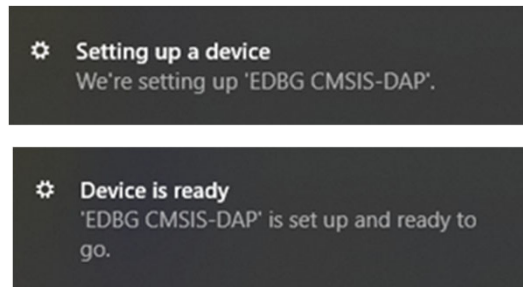
3.1 Compiling and Programming a First Application

Follow these steps to use the Curiosity Pro/Ultra evaluation kit in the MPLAB X IDE environment:

1. Launch MPLAB X IDE.
2. Connect the Curiosity Pro/Ultra evaluation kit through the DEBUG USB connector to the PC using a micro-USB cable (Standard-A to Micro-AB). When the Curiosity Pro/Ultra evaluation kit is connected to the computer for the first time, the operating system will install the software driver.

Note: The driver file supports 32-bit and 64-bit versions of Microsoft® Windows® XP™, Windows Vista™, Windows 7, Windows 8, Windows 10, and Windows 11.

Figure 3-1. Windows Messages Example



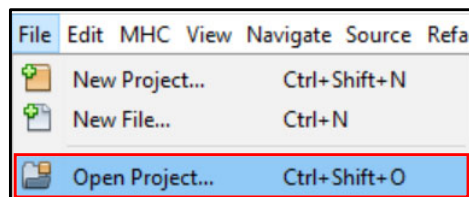
3. When the Curiosity Pro/Ultra evaluation kit is powered, the green power LED (PWR) will glow and the MPLAB X IDE will auto-detect the connected Curiosity Pro/Ultra evaluation kit.

Note: The microcontroller is programmed and debugged by the on-board embedded debugger, therefore an external programmer or debugger tool is not required.



4. From the Toolbar, select *File > Open Project*, or click (the project icon).

Figure 3-2. MPLAB X IDE - Open Project

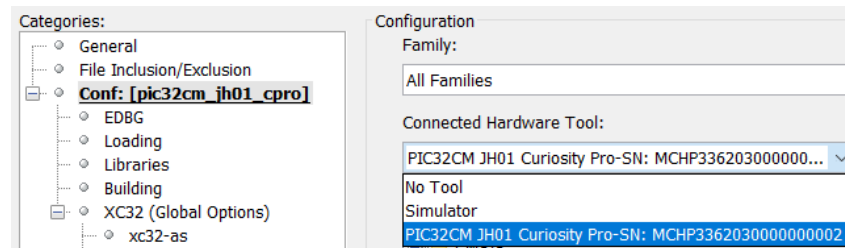


5. As an example, navigate to `C:\H3\csp_apps_pic32cm_jh00_jh01\apps\port\port_led_on_off_polling\firmware`, and then open the `pic32cm_jh01_curiosity_pro.x` project file.

Note: The system will prompt a message to upgrade the product DFP, upgrade if it is requested.

6. Select the *Connected Hardware Tool* and perform these actions:
 - a. To set the project as the main project: Select the project, right-click and choose Set as Main Project.
 - b. To open the project properties: Right-click and select Properties.
 - c. Select the connected Curiosity Pro/Ultra evaluation kit from the Connected Hardware Tool drop-down list.

Figure 3-3. Project Properties - Connect Hardware Tool Example



- d. Click **Apply**, then click **OK**.
7. Compiling and running the application:
 - a. To build and program the project, select *Production > Make and Program Device Main Project*, or click



(the build icon).



- b. To debug the project, select *Debug > Debug Main Project*, or click (the debug icon).
- c. The application is now programmed. Press the switch button SW0 to light ON the Ion-board LED0.
8. Open MCC and update MCC Core.

3.2 Proceeding with MCC

Follow these steps to proceed to the MCC:

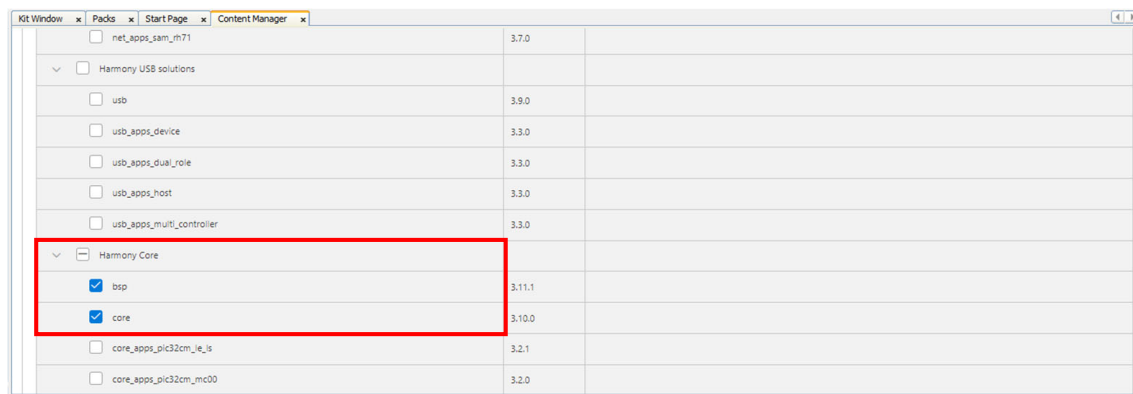
1. To open the MCC plugin, from the Tool bar, select *Tools > Embedded > MPLAB Code Configurator*, or click



(the MCC icon).

2. A message will be prompted to update the project to the latest MCC version, click **OK**.
3. Select MPLAB Harmony v3 in the MCC Content Manager wizard.
4. Scroll down to MPLAB Harmony v3 Core and select the *bsp* and *core* optional packages as shown in the following figure:

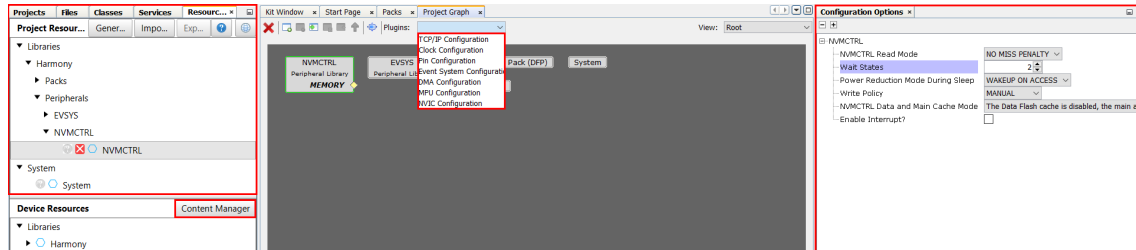
Figure 3-4. BSP and Core Optional Packages Selection



5. Scroll up and select **Finish** to open the MCC graphical user interface (GUI). The project will take some time to open in MCC as the tool will download any missing or selected packages.
6. The following messages might be displayed:

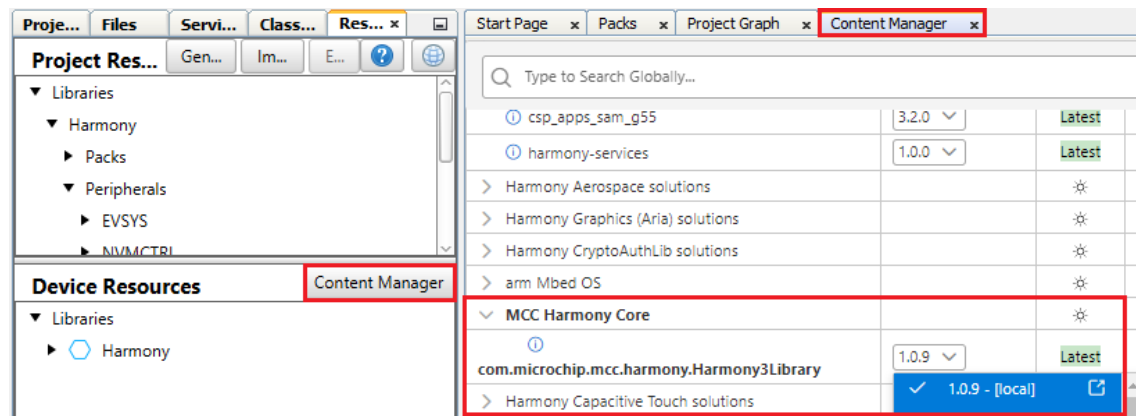
- a. To warn that project packages may differ from the local packages. Click **Continue**.
 - b. To update the DFP version. Accept by entering **Yes**.
 - c. To update project's Common Microcontroller Software Interface Standard (CMSIS). Confirm by selecting **Yes**.
7. The MCC GUI will be displayed as shown below:

Figure 3-5. MCC GUI Overview



8. Click the **Content Manager** tab.
9. In the Content Manager window, scroll down to MCC Harmony Core and choose the latest available version (1.0.9 is shown as an example).

Figure 3-6. MCC MPLAB Harmony v3 Code Update

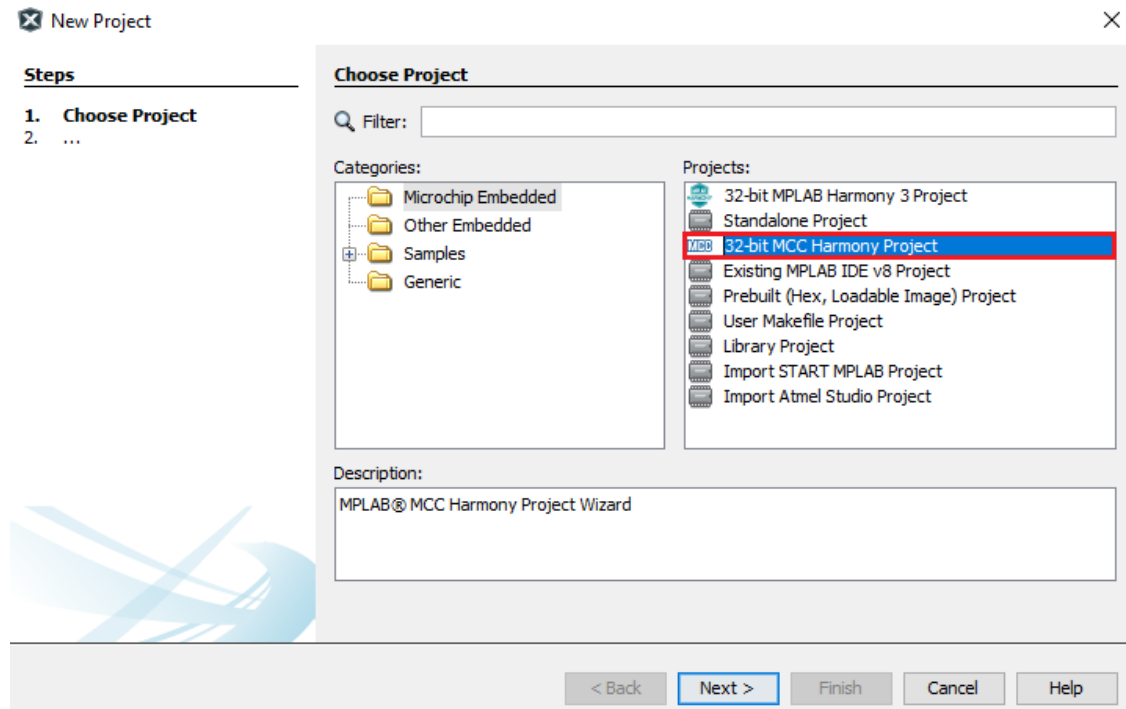


The MCC Core is now up to date. Users can get the recent MCC features for an application or for creating a project.

To create a MCC project follow these steps:

1. Go to *Files > New Project*. The New Project window will be displayed.
2. Under Steps, select **Choose Project**.
3. In the Choose Project, under Projects, select *32-bit MCC Harmony Project* as shown in the following figure:

Figure 3-7. MCC Project Creation under MPLAB X IDE



4. Click **Next**.

4. Troubleshooting

Compilation of Error Under MPLAB X IDE Due to Too Long of a Project Path

If an MPLAB X IDE project path is too long, the project will not compile and an error will be prompted. To solve this issue, move the project for compiling or programming to a smaller project path, for example, desktop or C:\).

5. References

For additional information regarding Microchip products and services, visit the Microchip [Website](#), or contact a local Microchip sales representative.

The following documents are provided for reference purposes.

- MPLAB X IDE:
www.microchip.com/mplab/mplab-x-ide
- MPLAB Harmony v3:
github.com/Microchip-MPLAB-Harmony
- MPLAB Discover:
mplab-discover.microchip.com/

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