How to Setup MPLAB Harmony v3 Software Development Framework

TB3232

Introduction

MPLAB® Harmony v3 is a software development framework consisting of compatible and inter-operational modules, such as peripheral libraries (PLIBs), drivers, system services, middleware and third-party libraries. The software development framework comes with a GUI tool, MPLAB Code Configurator (MCC), which provides an easy way to enable, configure, and use various MPLAB Harmony modules.

This document describes how to set up the MPLAB Harmony v3 software development framework on a computer that can be used for application development.

© 2024 Microchip Technology Inc. and its subsidiaries

Table of Contents

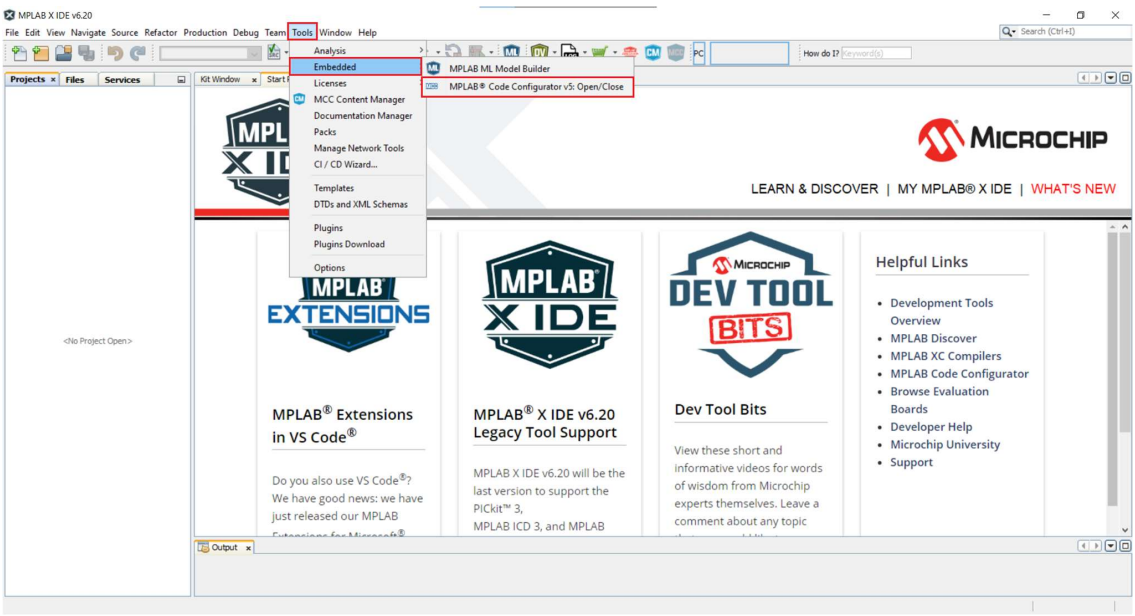
© 2024 Microchip Technology Inc. and its subsidiaries

1. Description

Follow these steps to setup and use the MPLAB Harmony v3 software development framework:

1. Download and Install MPLAB X Integrated Development Environment (IDE).
   Note: If MPLAB X IDE is installed, skip this step and go to step 3. If not, download the latest version of the MPLAB® X IDE.
2. Run the installer and follow the instructions prompted on the screen.
3. After installing MPLAB X IDE, the MPLAB Code Configurator and Content Manager are installed by default.
   a. To verify the MCC plugin, navigate to *Tools > Embedded* and ensure that the MPLAB Code Configurator plugin is available.

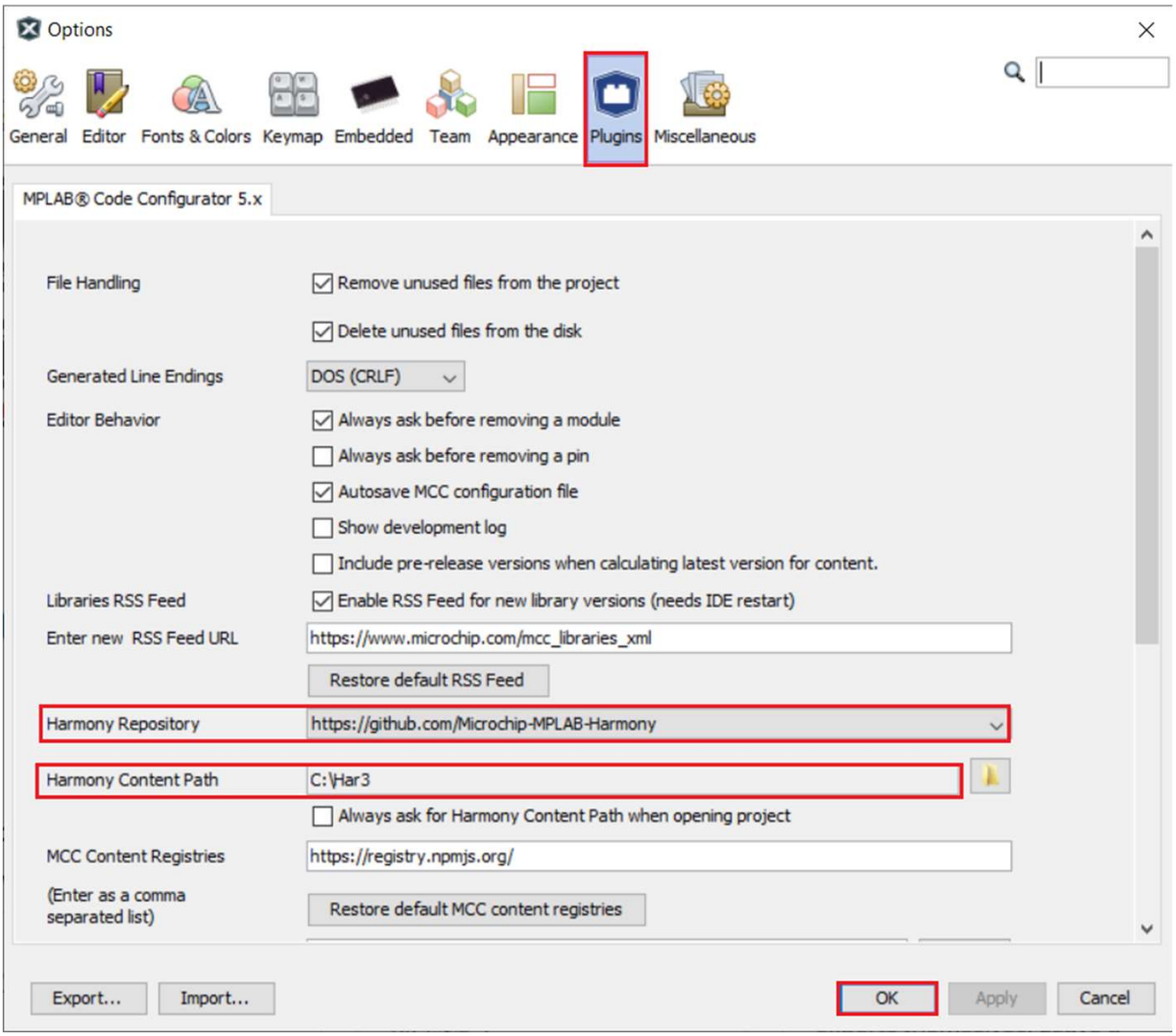
Figure 1-1. Verifying MCC Plugin



   b. Navigate to *Tools > Options > Plugins*.
   c. For **Harmony Repository,** choose github.com/Microchip-MPLAB-Harmony.
   d. For **Harmony Content Path**, enter C:/Har3 (specify the local folder for downloading the MPLAB Harmony packages, or use the default location).

© 2024 Microchip Technology Inc. and its subsidiaries

Figure 1-2. Content Manager Setup

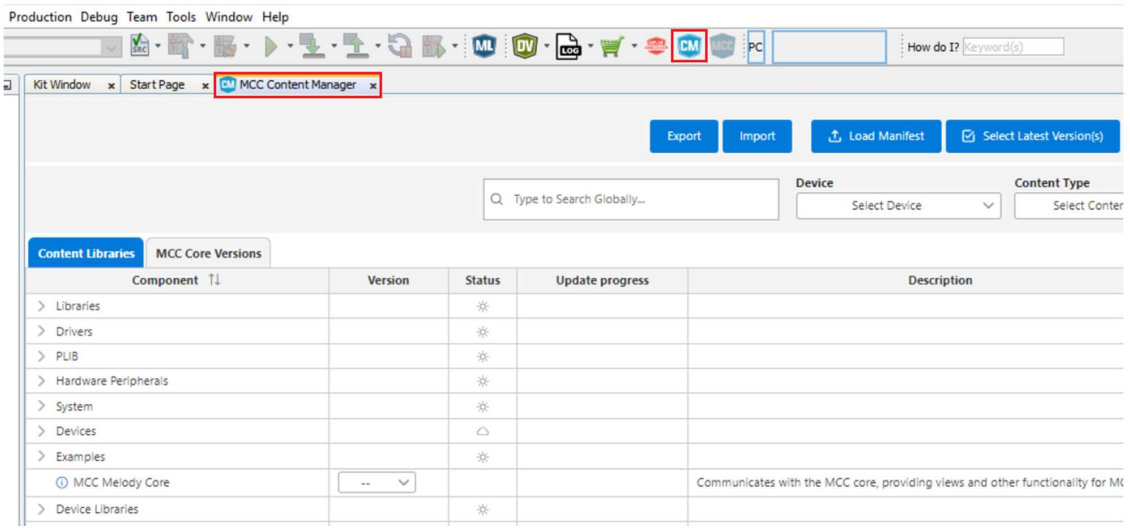


e. Click **OK**.

f. Launch the MCC Content Manager by clicking the **MCC Content Manager** icon to verify the installation of the Content Manager.

© 2024 Microchip Technology Inc. and its subsidiaries

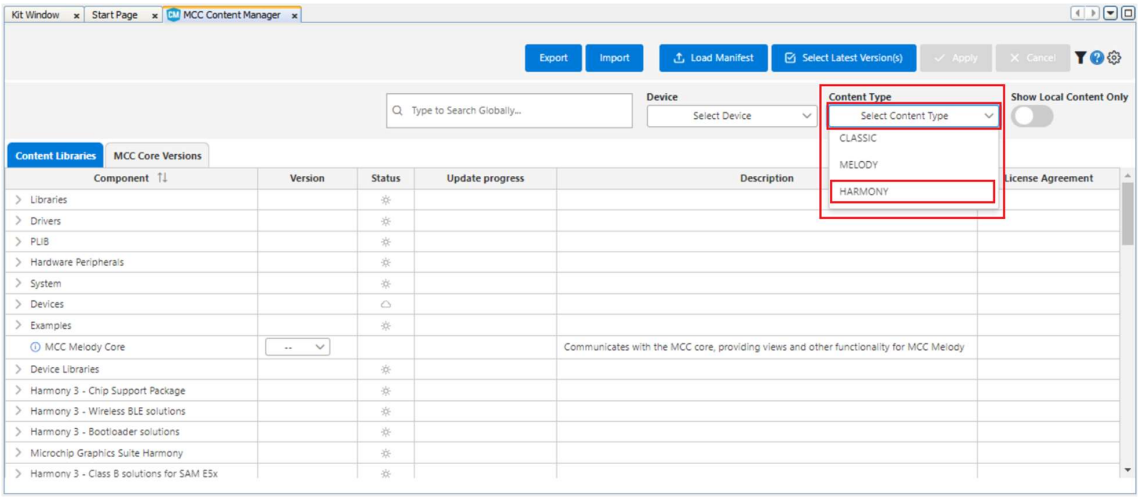
Figure 1-3. Verifying MCC Content Manager



Note: The MCC Content Manager is common for MCC Melody, MCC Classic, and MCC Harmony.

g. To download 32-bit content, select **Harmony** from the **Content Type** drop-down menu.

Figure 1-4. Selecting Harmony



4. MPLAB Harmony v3 contents are grouped in multiple packages, which are available for download in the GitHub repository at: https://github.com/Microchip-MPLAB-Harmony/. All these packages are not required for the development of an application, therefore users can download only the required packages.
   The following packages are mandatory to use MPLAB Harmony v3:
   - **CMSIS_5:** This repository contains software components and tools designed to simplify the development of applications for Arm® Cortex®-M microcontrollers. CMSIS provides a standardized hardware abstraction layer and a set of common APIs.
   - **content_manager_artifacts:** This repository contains the implementation of the MPLAB Harmony v3 Content Manager tool (MHCM). The MHCM is an easy to use development tool with a Graphical User Interface (GUI) that simplifies the manipulation of MPLAB Harmony

© 2024 Microchip Technology Inc. and its subsidiaries

Content. The MHCM is available as a plugin that directly integrates with the MPLAB X IDE or as a separate Java executable for standalone use with other development environments.

- **csp:** This repository contains the MPLAB Harmony v3 Chip Support Package (CSP). The CSP supports the initialization of Microchip 32-bit SAM and PIC® microcontroller and microprocessor devices. It provides Application Program Interfaces (APIs) to develop simple applications that control peripheral hardware with minimal external dependencies.
- **Devices:** This repository contains the MPLAB Harmony v3 supported devices list, used by Microchip MPLAB Code Configurator (MCC) internally.
- **harmony_services:** MPLAB Harmony Services repository is required to launch MPLAB Harmony package/component HTML-based plugins. It contains common Harmony generic plugin and Harmony file server java libraries required for HTML-based plugins.
- **quick_docs:** This repository contains the MPLAB Harmony v3 Quick Documentation Package. Quick documents are standalone HTML pages that help to get started developing applications using Microchip 32-bit SAM and PIC MCUs/MPUs using MPLAB Harmony v3 software framework.

The following packages are optional and can be downloaded when needed:

- **core:** This repository provides drivers and services with simple to use abstractions of peripherals and shared resources on Microchip 32-bit SAM and PIC devices. Drivers and services may also provide advanced capabilities, such as buffer queuing, peripheral sharing, and RTOS support.
- **gfx:** The graphics repository contains the files for the MPLAB Harmony Graphics Suite, quick-start applications, drivers, tools, libraries, and templates.
- **usb:** The USB repository provides the USB controller drivers for 32-bit PIC and SAM devices, as well as Host and device middleware with support for common device classes.
- **net:** This repository provides a fast-to-market TCP/IP stack for 32-bit PIC and SAM microcontrollers. It contains multiple applications that demonstrate communication over the TCP/IP using well-known protocols, such as TCP, UDP, HTTP, SMTP, and so on.
- **others:** There are many other packages that are supported in MPLAB Harmony v3. For additional information, refer to the MPLAB Harmony GitHub repository.

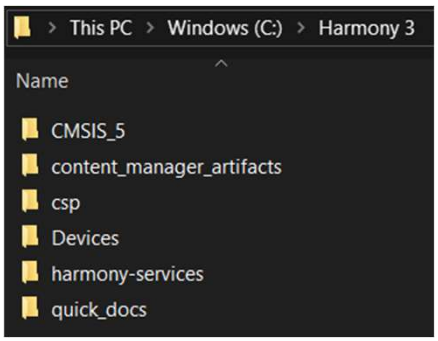
Users can download the MPLAB Harmony v3 packages using any one of these options:

- **Using the MCC Content Manager Wizard:** There are two ways to use the MCC Content Manager Wizard to download the MPLAB Harmony v3 packages:
  i. Creating a new Harmony v3 project.
  ii. Using an existing project.

  For additional information, refer to the MPLAB® Harmony v3 Software Framework For MCUs.
- **Manually cloning from GitHub:** To manually clone a repository, follow the instructions available at: https://help.github.com/en/articles/cloning-a-repository.
  Note: After all the required MPLAB Harmony v3 repositories are cloned, these repositories must be in the same folder as shown in the following figure.

© 2024 Microchip Technology Inc. and its subsidiaries

Figure 1-5. MPLAB Harmony v3 Packages



CAUTION GitHub provides a clone or download option on a repository page. While this option is provided by GitHub to download a repository, it is discouraged to use this option for MPLAB Harmony v3 repositories. Using this option will render certain MPLAB Harmony v3 features inoperable.

5. **Creating a MPLAB Harmony v3 Project:** After the required MPLAB Harmony v3 repositories are available in a folder, follow the instructions given in the links below to create a MPLAB Harmony v3 project:
   - Create a new MPLAB Harmony v3 project using MCC
   - Update and Configure an Existing MHC-based MPLAB Harmony v3 Project to MCC-based Project

Note: All MPLAB Harmony v3 projects are standalone, which can be created at any location on the computer (irrespective of MPLAB Harmony v3 repositories location) and can be ported to any other computer.

© 2024 Microchip Technology Inc. and its subsidiaries

2. References

- For additional information on MPLAB Harmony v3, visit the following Microchip websites: https://www.microchip.com/mplab/mplab-harmony and microchipdeveloper.com/harmony3:start
- GitHub help is available at: https://help.github.com/
- Getting started with Git (version control) is available at: https://git-scm.com/book/en/v2/Getting-Started-About-Version-Control
- Getting Started with MPLAB Harmony V3 using MCC: Getting Started with MPLAB Harmony v3 Using MPLAB Code Configurator
- Microchip MPLAB Harmony v3: github.com/Microchip-MPLAB-Harmony
- For additional info about 32-bit Microcontroller Collaterals and Solutions, refer to: ww1.microchip.com/downloads/aemDocuments/documents/MCU32/ProductDocuments/ReferenceManuals/32-bit-Microcontroller-Collateral-and-Solutions-Reference-Guide-DS70005534.pdf
- How to Set up the Tools Required to Get Started with MPLAB® Harmony v3 and MCC

© 2024 Microchip Technology Inc. and its subsidiaries

3. Revision History

Revision E - 12/2024

The following updates were performed for this revision:

- Updated Description with new steps and images to bring the document up-to-date with the latest MCC versions and Harmony v3
- Updated References with two new entries

Revision D - 01/2023

Throughout the document references to the MHC were converted to MCC where applicable.

Updated the following steps with new DFP and MCC information in Description:

- Step 4 dev_packs, mhc, and downloading options
- Step 5 added new hyperlinks for accessing MCC information

The following figures were updated to reference the MCC:

- Figure 1-1 MCC Plugins Window and Figure 1-2 Plugin Installer

Revision C - 04/2020

Removed obsolete information about downloading from GitHub in Step Four.

Revision B - 02/2020

Typographical corrections were done throughout the document.

Revision A - 11/2019

This is the initial released version of this document.

© 2024 Microchip Technology Inc. and its subsidiaries

Microchip Information

Trademarks

The “Microchip” name and logo, the “M” logo, and other names, logos, and brands are registered and unregistered trademarks of Microchip Technology Incorporated or its affiliates and/or subsidiaries in the United States and/or other countries (“Microchip Trademarks”). Information regarding Microchip Trademarks can be found at https://www.microchip.com/en-us/about/legal-information/microchip-trademarks.

ISBN: 979-8-3371-0313-6

Legal Notice

This publication and the information herein may be used only with Microchip products, including to design, test, and integrate Microchip products with your application. Use of this information in any other manner violates these terms. Information regarding device applications is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. Contact your local Microchip sales office for additional support or, obtain additional support at www.microchip.com/en-us/support/design-help/client-support-services.

THIS INFORMATION IS PROVIDED BY MICROCHIP “AS IS”. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, OR WARRANTIES RELATED TO ITS CONDITION, QUALITY, OR PERFORMANCE.

IN NO EVENT WILL MICROCHIP BE LIABLE FOR ANY INDIRECT, SPECIAL, PUNITIVE, INCIDENTAL, OR CONSEQUENTIAL LOSS, DAMAGE, COST, OR EXPENSE OF ANY KIND WHATSOEVER RELATED TO THE INFORMATION OR ITS USE, HOWEVER CAUSED, EVEN IF MICROCHIP HAS BEEN ADVISED OF THE POSSIBILITY OR THE DAMAGES ARE FORESEEABLE. TO THE FULLEST EXTENT ALLOWED BY LAW, MICROCHIP’S TOTAL LIABILITY ON ALL CLAIMS IN ANY WAY RELATED TO THE INFORMATION OR ITS USE WILL NOT EXCEED THE AMOUNT OF FEES, IF ANY, THAT YOU HAVE PAID DIRECTLY TO MICROCHIP FOR THE INFORMATION.

Use of Microchip devices in life support and/or safety applications is entirely at the buyer’s risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

Microchip Devices Code Protection Feature

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

- Microchip products meet the specifications contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is secure when used in the intended manner, within operating specifications, and under normal conditions.
- Microchip values and aggressively protects its intellectual property rights. Attempts to breach the code protection features of Microchip products are strictly prohibited and may violate the Digital Millennium Copyright Act.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of its code. Code protection does not mean that we are guaranteeing the product is “unbreakable”. Code protection is constantly evolving. Microchip is committed to continuously improving the code protection features of our products.

© 2024 Microchip Technology Inc. and its subsidiaries