UM1715
User manual

Getting started with STM32F072 Discovery kit software development tools

Introduction

This document describes the software environment recommendations required to build an application using the STM32F072 Discovery kit (32F072BDISCOVERY). The document provides guidelines to novice user on how to build and run a sample example and how to create and build his own application. It has the following structure: the first chapter presents the software and hardware requirements (some toolchains supporting the STM32 families, ST-LINK/V2 installation and firmware package presentation). The second chapter provides step by step guidelines on how to execute and debug an application example using some toolchains:

- IAR Embedded Workbench® for ARM (EWARM) by IAR systems,
- Microcontroller Development Kit for ARM (MDK-ARM) by Keil™,
- TrueSTUDIO® by Atollic.

Although this user manual does not cover all the topics relevant to software development environments, it demonstrates the first basic steps necessary to get started with the compilers/debuggers and includes references for complementary information.

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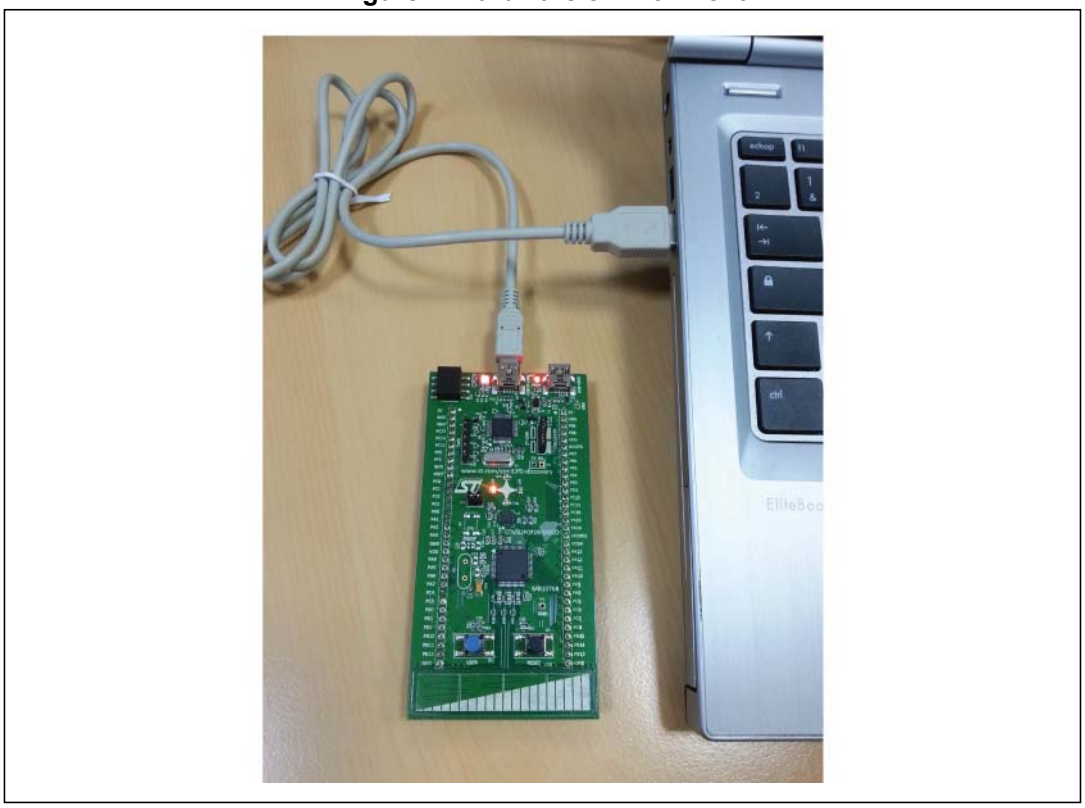
1 System requirements

Before running the application, please proceed as follows;

1. Install your preferred Integrated Development Environment (IDE)
2. The ST-LINK/V2 driver is installed automatically. In case of problem, you can install manually the driver from the toolchains install directory (further details are available in *Section 1.2: ST-LINK/V2 installation*).
3. Download the STM32F072 Discovery firmware from STMicroelectronics website, at *www.st.com/stm32f0-discovery*
4. Establish the connection with the STM32F072 Discovery board as shown hereafter in *Figure 1*.

Figure 1. Hardware environment



The above steps are detailed in the coming sections.

To run and develop any firmware applications on your STM32F072 Discovery board, the minimum requirements are as follows:

- Windows PC (XP, Vista, 7, 8),
- 'USB type A to Mini-B' cable, used to power the STM32F072 Discovery board (through USB connector CN1) from host PC and connect to the embedded ST-LINK/V2 for debugging and programming.

1.1 IDEs supporting STM32 families

STMicroelectronics STM32 families of 32-bit ARM Cortex-M core-based microcontrollers are supported by a complete range of software tools.

It encompasses traditional integrated development environments IDEs with C/C++ compilers and debuggers from major third-party companies (free versions up to 64KB of code, depending on partner), completed with innovative tools from STMicroelectronics.

The following table includes some general information about some integrated development environments as well as the version supporting the STM32F072B product.

Table 1. Most used integrated development environments

Toolchain	Company	Compiler	Version	Information(1)
EWARM	IAR Systems ®	IAR C/C++	6.70.2 and later	www.iar.com 30-day evaluation edition KickStart edition(16Ko Limitation for Cortex M0)
MDK-ARM	Keil™	ARMCC	4.73 and later	www.keil.com MDK-Lite (32Ko Code size limitation)
TrueSTUDIO	© Atollic	GNUC	4.3.0 and later	www.atollic.com 32Ko Limitation (8Ko on Cortex-M0 and Cortex-M1) 30 day Professional version (Trial)

1. Register prior to downloading the toolchain

1.2 ST-LINK/V2 installation

The STM32F072 Discovery board includes the ST-LINK/V2 embedded debug tool interface. The interface requires to install the ST-LINK/V2 dedicated USB driver. The STM32F072 Discovery board includes an ST-LINK/V2 embedded debug tool interface that is supported by the following software toolchains:

- IAR™ Embedded Workbench for ARM (EWARM)

  The toolchain is installed by default in the *C:\Program Files\IAR Systems\Embedded Workbench x.x* directory on the PC local hard disk.

  After installing EWARM, install the ST-LINK/V2 driver by running the ST-Link_V2_USB.exe from *IAR_INSTALL_DIRECTORY]\Embedded Workbench x.x\arm\drivers\ST-Link \ST-Link_V2_USBdriver.exe*

- RealView Microcontroller Development Kit (MDK-ARM) toolchain

  The toolchain is installed by default in the *C:\Keil* directory on the PC local hard disk; the installer creates a start menu µVision4 shortcut.

  When connecting the ST-LINK/V2 tool, the PC detects new hardware and asks to install the ST-LINK_V2_USB driver. The “Found New Hardware wizard” appears and

guides you through the steps needed to install the driver from the recommended location.

- Atollic TrueSTUDIO® STM32

  The toolchain is installed by default in the *C:\Program Files\Atollic* directory on the PC local hard disk.

  The ST-Link_V2_USB.exe is installed automatically when installing the software toolchain.

Complementary information on the firmware package content and the STM32F072 Discovery board requirements are available in the user manual UM1674 - Getting started with the STM32F072 Discovery kit.

Note: The embedded ST-LINK/V2 supports only SWD interface for STM32 devices.

1.3 Firmware package

The STM32F072 Discovery firmware applications, demonstration and IPs examples are provided in one single package and supplied in one single zip file. The extraction of the zip file generates one folder, STM32F072B-Discovery_FW_VX.Y.Z, which contains the following sub folders:

Figure 2. Firmware package content

Template project: pre-configured project with empty main function to be customized by users. This is helpful to start creating your own application based on the peripherals drivers.

Master workspace: Assembly of all projects available within this firmware package.

Peripheral examples: Include a set of examples for each peripheral ready to be run.

2 Executing and debugging firmware using the software toolchains

2.1 EWARM toolchain

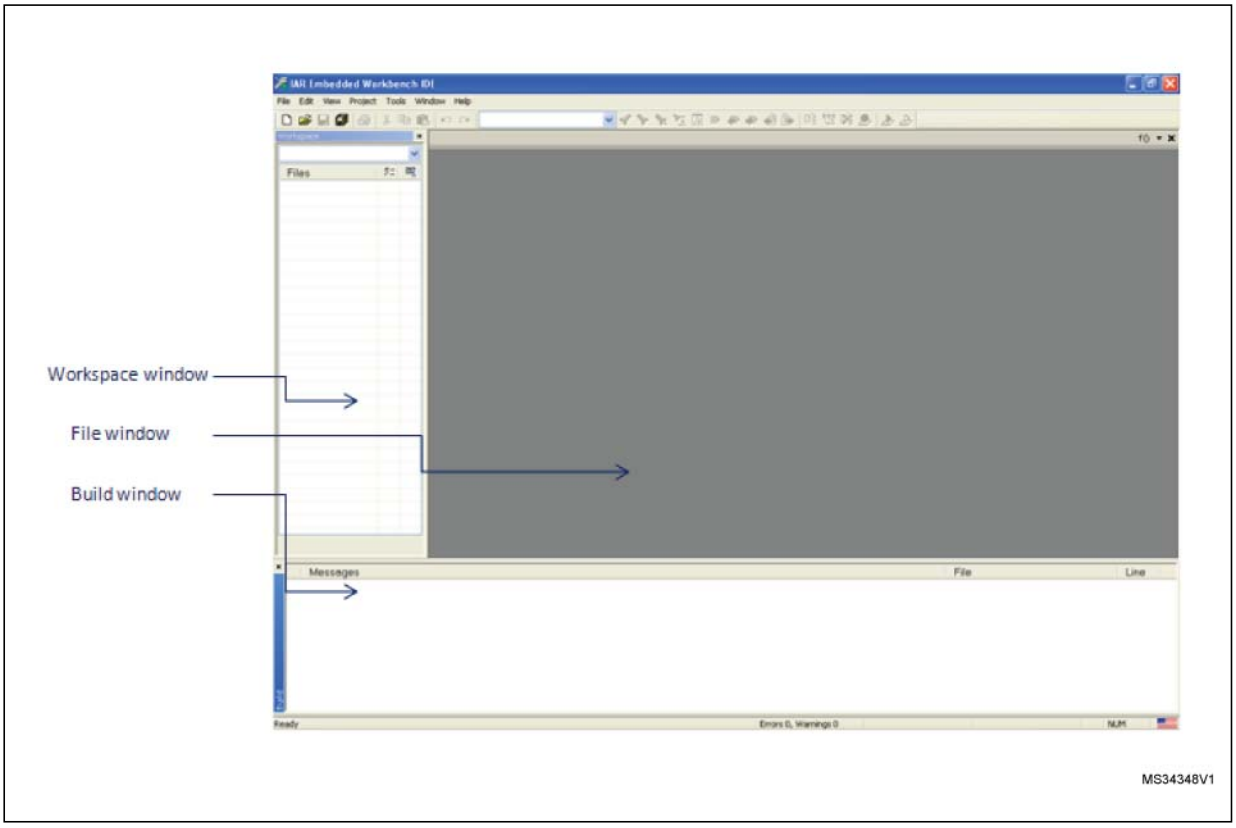
Follow the procedure to compile/link and execute an existing EWARM project.

The following steps can be applied to an already existing example, demonstration or template project available at STM32F072 Discovery firmware package available on STMicroelectronics website.

First of all, you need to go through firmware/readme.txt file which contains the firmware description and hardware/software requirements.

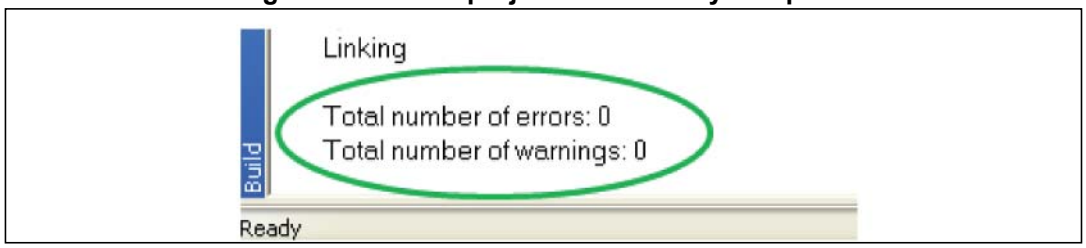
1. Open the IAR Embedded Workbench® for ARM (EWARM).
   Figure 3 shows the basic names of the windows referred to in this document.

Figure 3. IAR embedded workbench IDE



2. In the **File** menu, select **Open** and click **Workspace** to display the Open Workspace dialog box. Browse to select either an example or demonstration or template workspace file and click **Open** to launch it in the **Project window**.
3. In the **Project** menu, select **Rebuild All** to compile your project
4. If your project is successfully compiled, the following window in *Figure 4* is displayed.

Figure 4. EWARM project successfully compiled



To change the project settings (Include and preprocessor defines), go through project options:

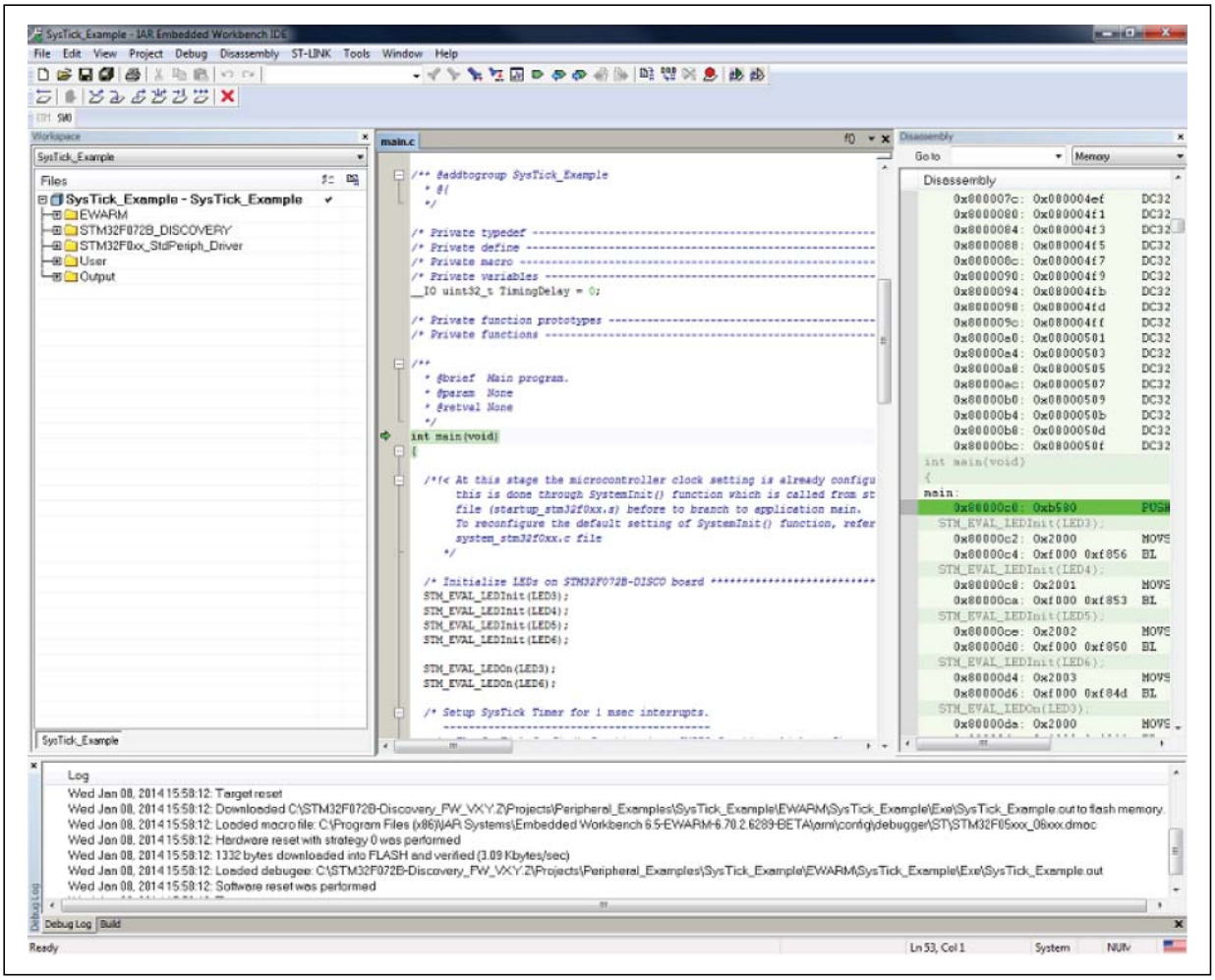
- For ‘Include directories’, select
  Project>Options…>C/C++ compiler>
- For pre-processor, define
  Project>Options…C/C++ compiler>pre-processor>

5. In the IAR Embedded Workbench IDE, from the **Project** menu, select **Download** and **Debug** or alternatively, click on the **Download and Debug** button the in tool bar, to program the Flash memory and start debugging.

Figure 5. Download and Debug button

The debugger in the IAR Embedded Workbench can be used to debug source code at C and assembly levels, set breakpoints, monitor individual variables and watch events during the code execution.

Figure 6. IAR embedded workbench debugger screen



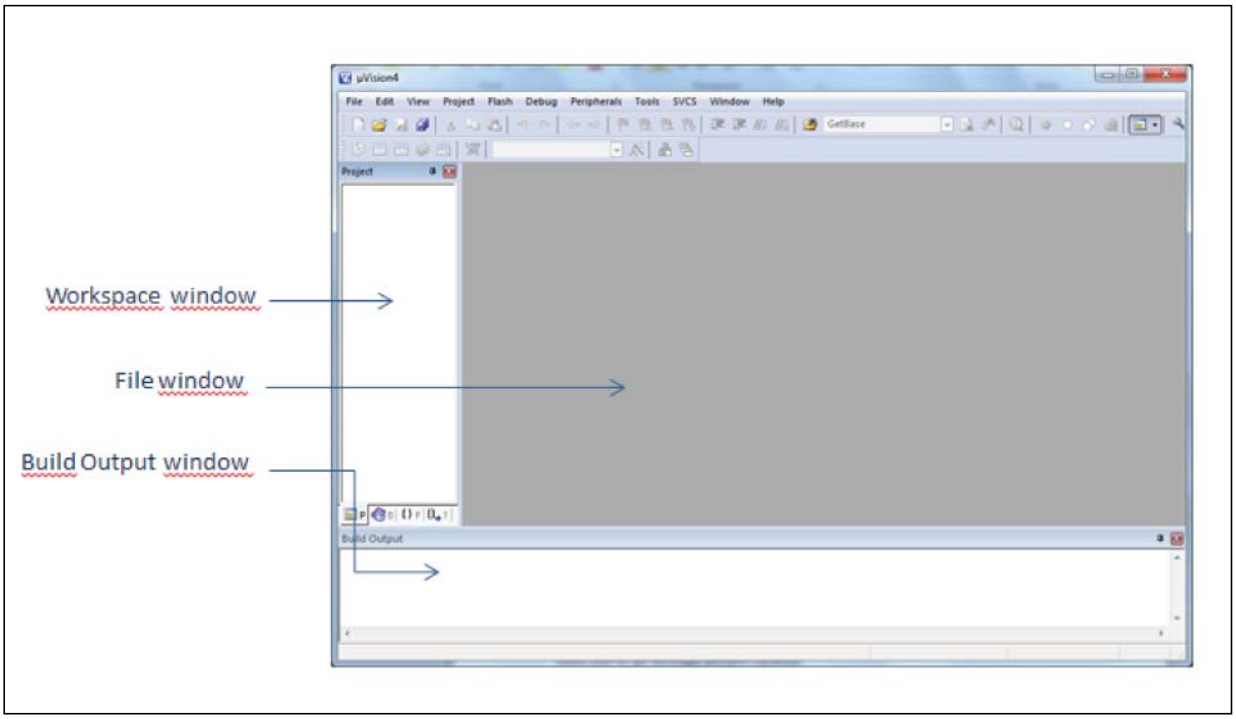
To run your application, from the **Debug** menu, select **Go**. Alternatively, click on the **Go** button in the toolbar to run your application.

Figure 7. Go button

2.2 MDK-ARM toolchain

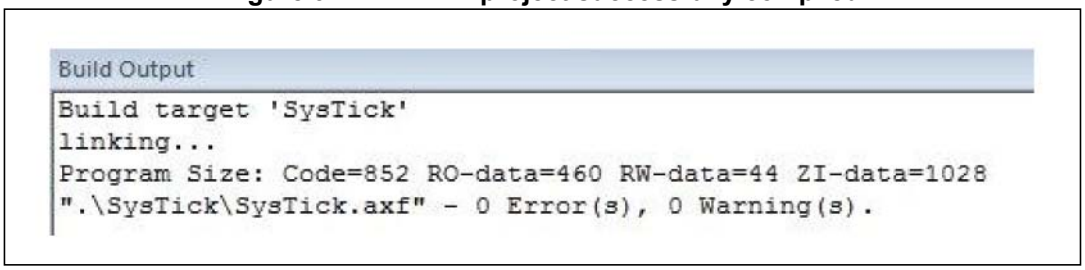
1. Open Keil MDK-ARM Microcontroller Kit,
   Figure 8 shows the basic names of the “Keil uVision4” windows referred to in this document.

Figure 8. uVision4 IDE



2. In the **Project** menu, select **Open Project**. Browse to select either an example or demonstration or template project file and click **Open** to launch it in the Project window.
3. In the **Project** menu, select **Rebuild All target files** to compile your project
4. If your project is successfully compiled, the following window (*Figure 9*) is displayed.

Figure 9. MDK-ARM project successfully compiled



If you need to change your project settings (Include and preprocessor defines), go through the project options:

- For ‘Include directories’, select

  Project>Options for Target > C/C++ > Include Paths

- For pre-processor definition

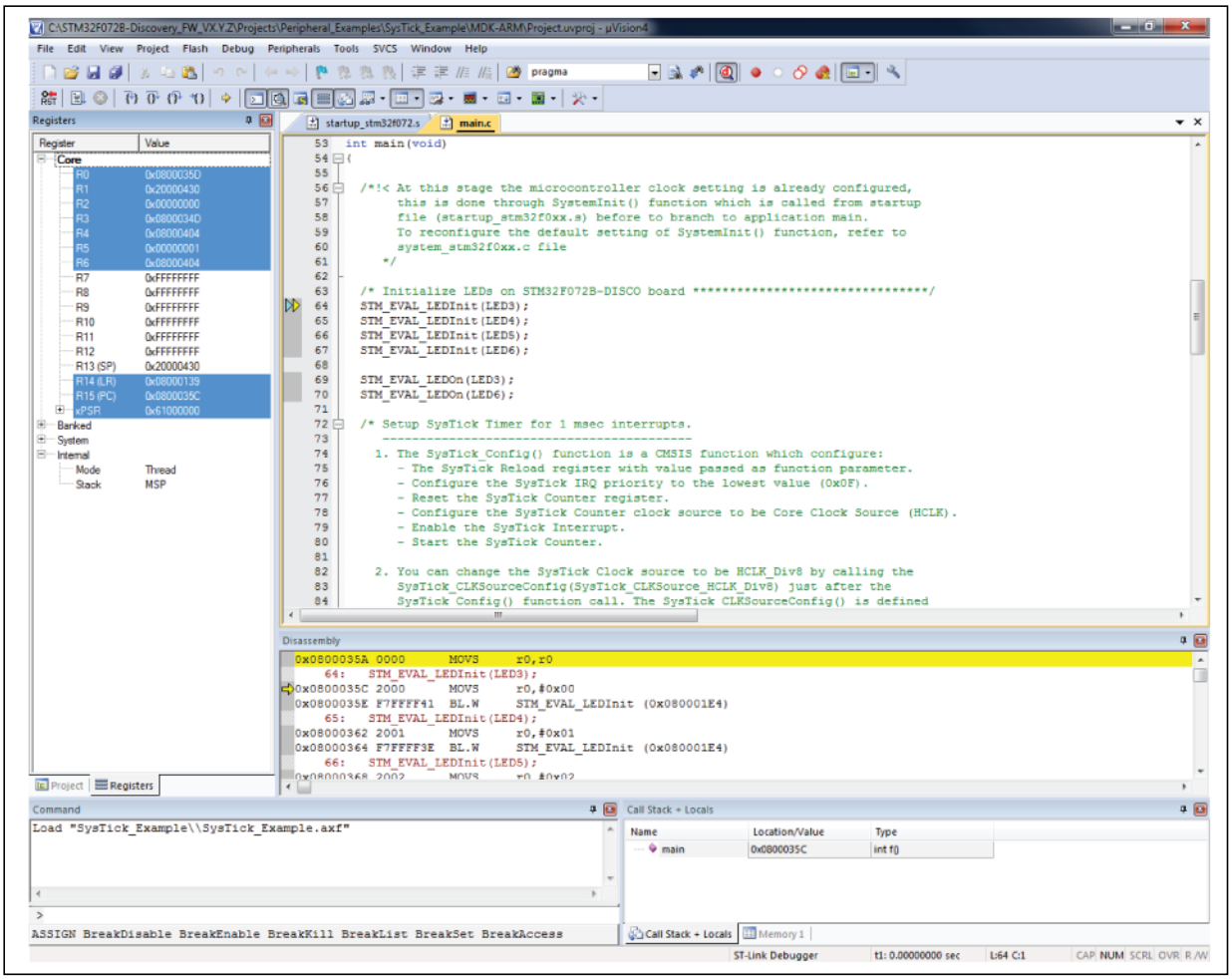
  Project>Options for Target > C/C++ > Preprocessor symbols > Define

5. In the MDK-ARM IDE, from the **Debug** menu, select **Start/Stop Debug Session** or, alternatively, click the **Start/Stop Debug Session** button in the tool bar to program the Flash memory and begin debugging.

Figure 10. Start/Stop debug session button

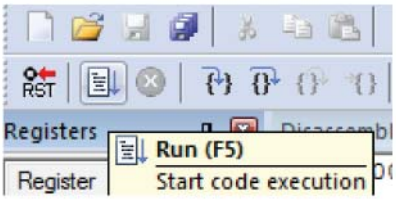
6. The debugger in the MDK-ARM can be used to debug source code at C and assembly levels, set breakpoints, monitor individual variables and watch events during the code execution.

Figure 11. MDK-ARM debugger screen



To run your application, from the **Debug** menu, select **Run**. Alternatively, click the **Run** button in the toolbar to run your application.

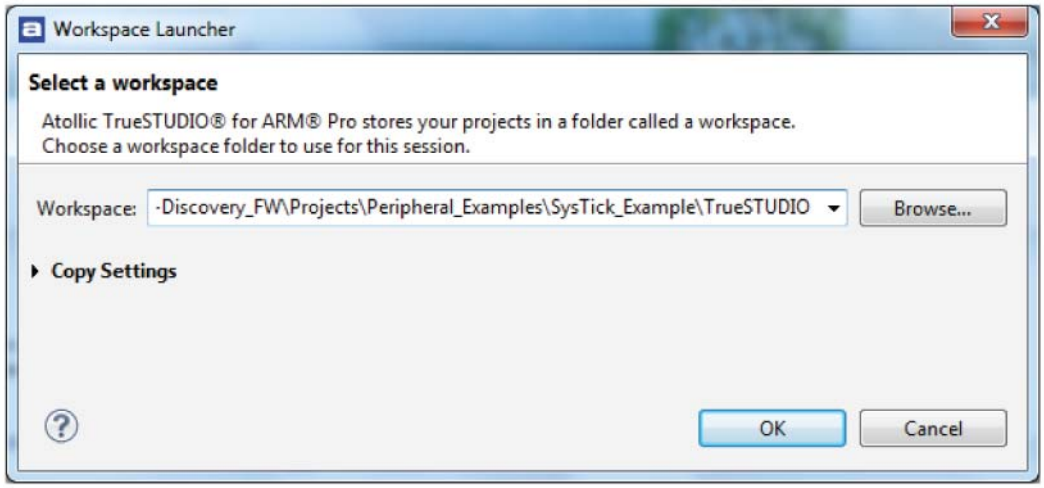
Figure 12. Run button



2.3 TrueSTUDIO toolchain

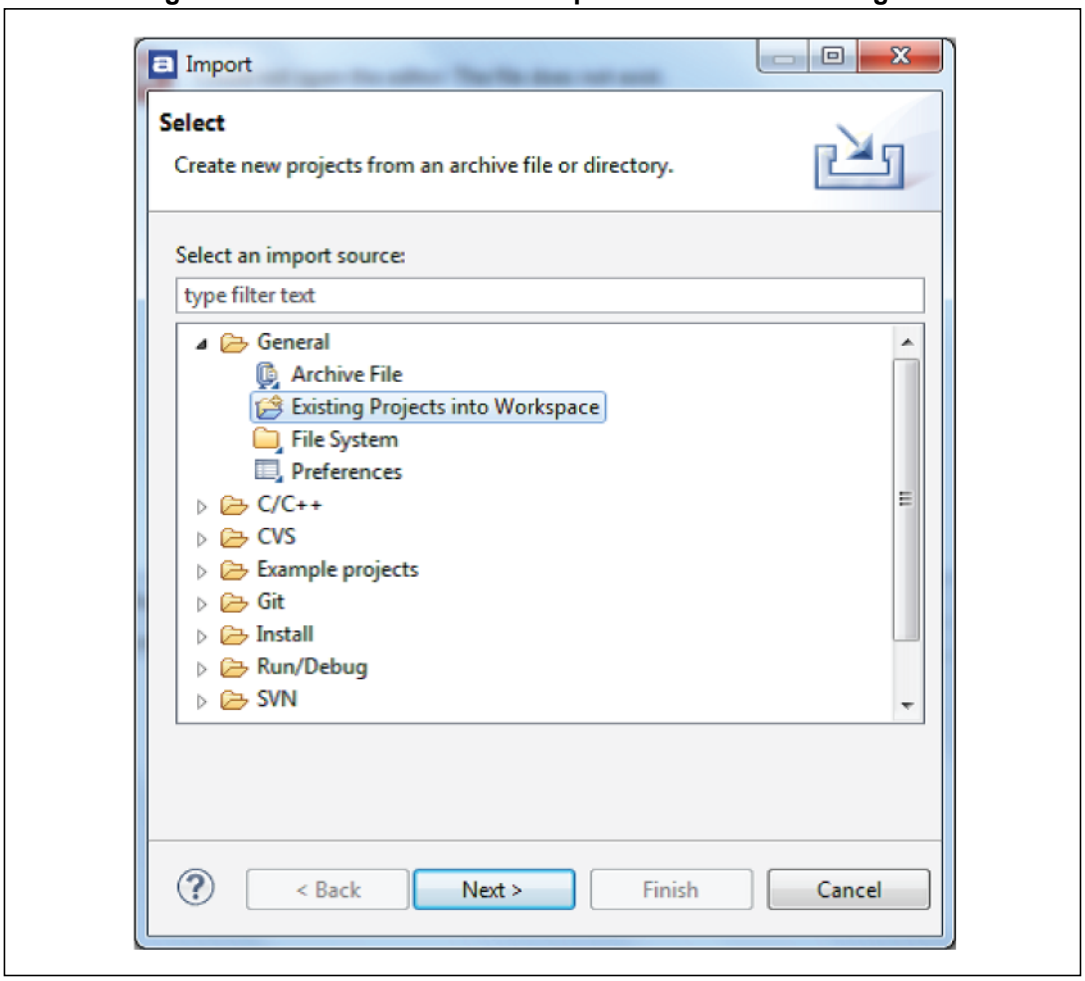
1. Open Atollic TrueSTUDIO® for ARM product. The program launches and asks for the Workspace location.

Figure 13. TrueSTUDIO workspace launcher dialog box



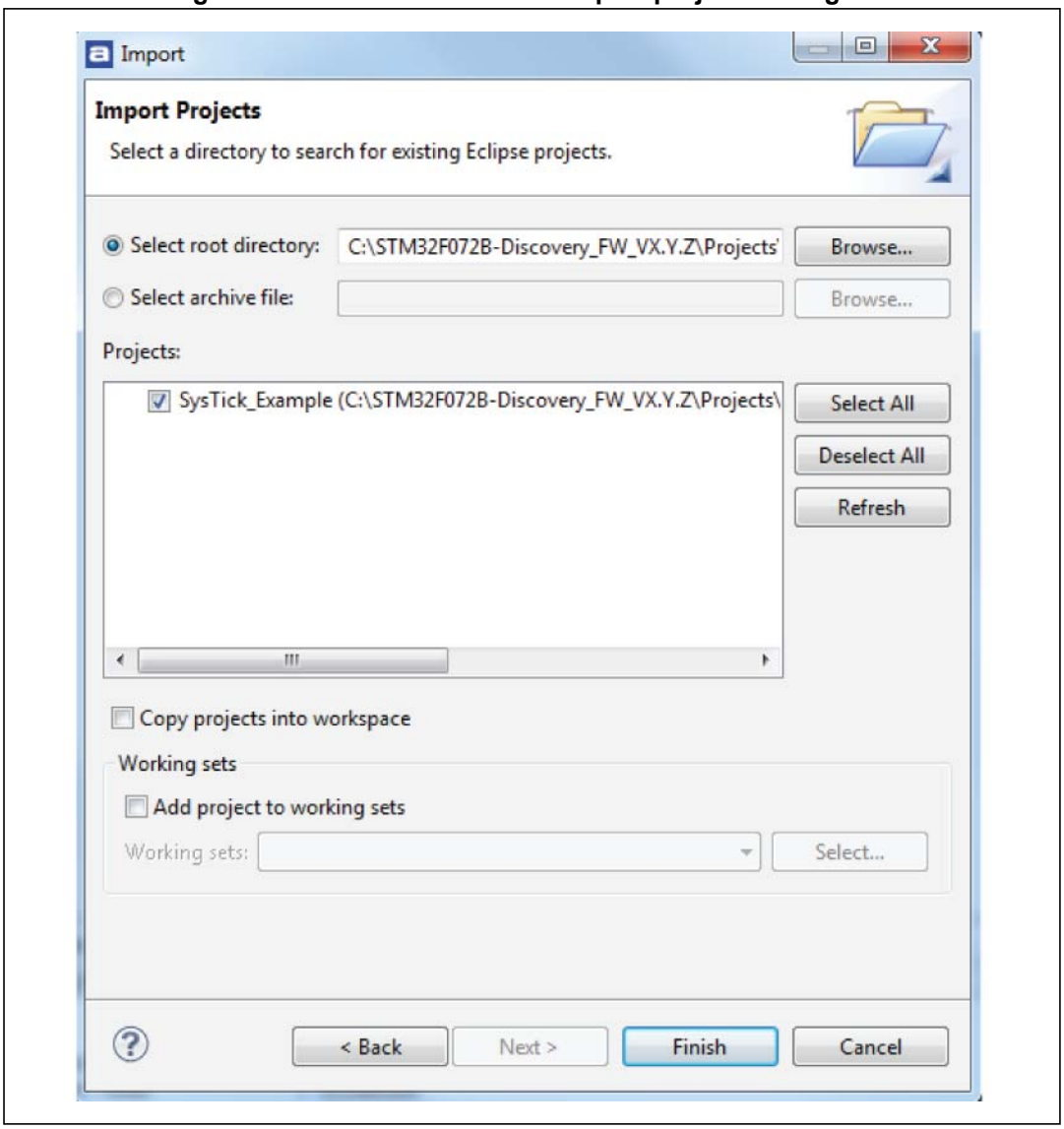
2. Browse to select a TrueSTUDIO workspace of either an example or demonstration or template workspace file and click **OK** to load it.
3. To load an existing project in the selected workspace, select **Import** from the File menu to display the Import dialog box.
4. In the Import window, open **General**, select **Existing Projects** into Workspace and click **Next**.

Figure 14. Atollic TrueSTUDIO® import source select dialog box



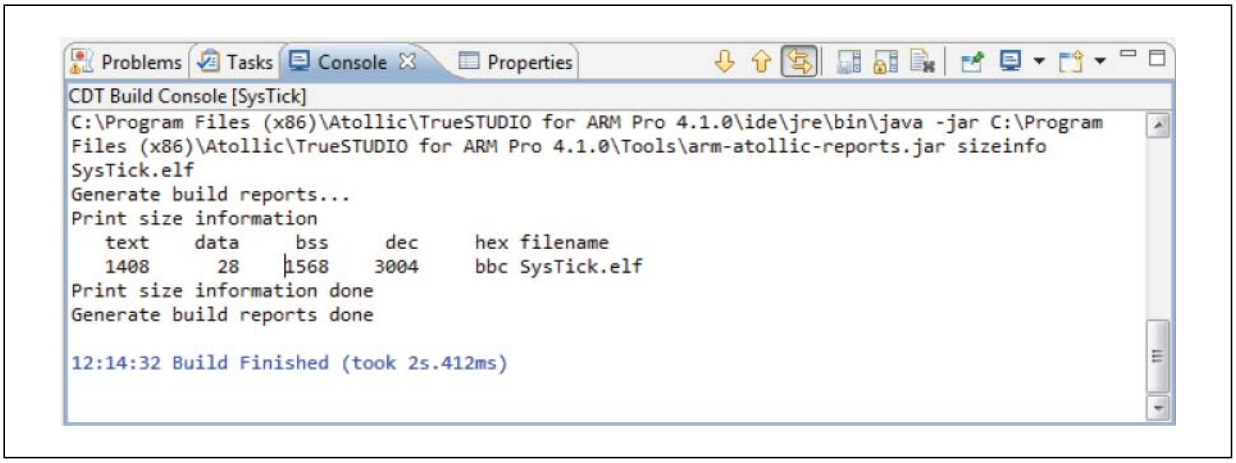
5. Click **Select root directory**, browse to the TrueSTUDIO workspace folder

Figure 15. Atollic TrueSTUDIO® import projects dialog box



6. In the **Projects** panel, select the project and click **Finish**.
7. In the **Project Explorer**, select the project, open the **Project** menu, and click **Build Project**.
8. If your project is successfully compiled, the following messages will be displayed on the Console window.

Figure 16. TrueSTUDIO® project successfully compiled

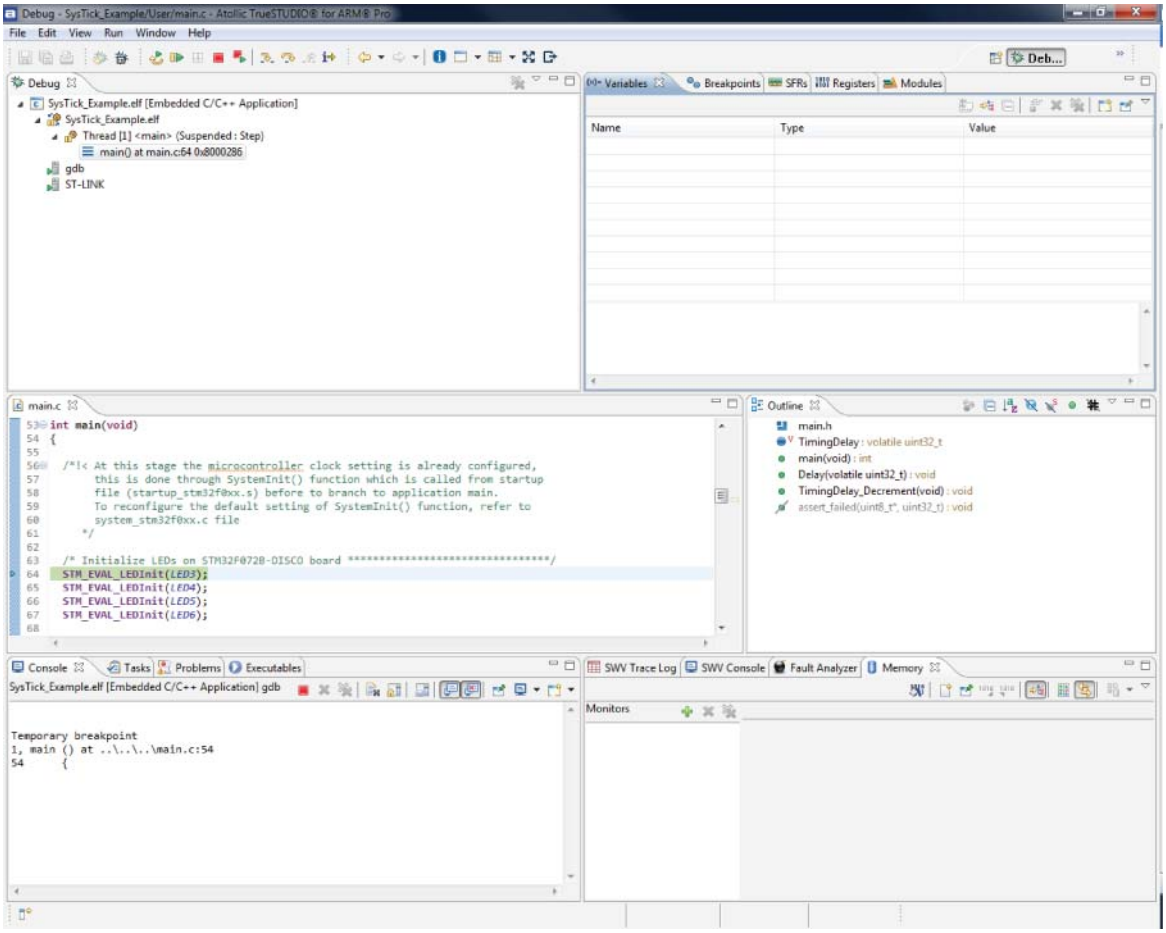


If you need to change the project settings (Include directories and preprocessor defines), go through Project>Properties, select C/C++ Build>Settings from the left panel:

- For 'Include directories'
  C Compiler>Directories>Include path
- For pre-processor defines
  C Compiler>Symbols> Defined symbols

9. To debug and run the application, select the project In the **Project Explorer** and press **F11** to start a debug session (see *Figure 17*).

Figure 17. TrueSTUDIO debug window



The debugger in the Atollic TrueSTUDIO can be used to debug source code at C and assembly levels, set breakpoints, monitor individual variables and watch events during the code execution.

To run your application, from the Run menu, select Resume, or alternatively click the Resume button in the toolbar.

3 Revision history

Table 2. Document revision history

Date	Revision	Changes
25-Apr-2014	1	Initial release.

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