



## Stellaris® LM3S811 Evaluation Kit

The Stellaris® LM3S811 Evaluation Kit provides a low-cost way to start designing with Stellaris® microcontrollers. The LM3S811 Evaluation Board (EVB) can function as either a complete evaluation target, or as a debugger interface to any external Stellaris® device. The included USB cable is all that is needed to provide power and communication to the host PC.

### LM3S811 Evaluation Board

#### Requirements

- You have a PC, with a USB interface, running Microsoft® Windows 2000, XP, or 2003
- You have the Stellaris® LM3S811 Evaluation Kit Documentation and Software CD

The LM3S811 Evaluation Board is configured for immediate use. To power the EVB, use the USB cable supplied in the kit. Connect the mini-b (smaller) end of the USB cable to the connector labeled “USB” on the EVB. Connect the other end (Type A) to a free USB port on your host PC. The USB is capable of sourcing up to 500 mA for each attached device, which is sufficient for the evaluation board. If connecting the board through a USB hub, it must be a powered hub.

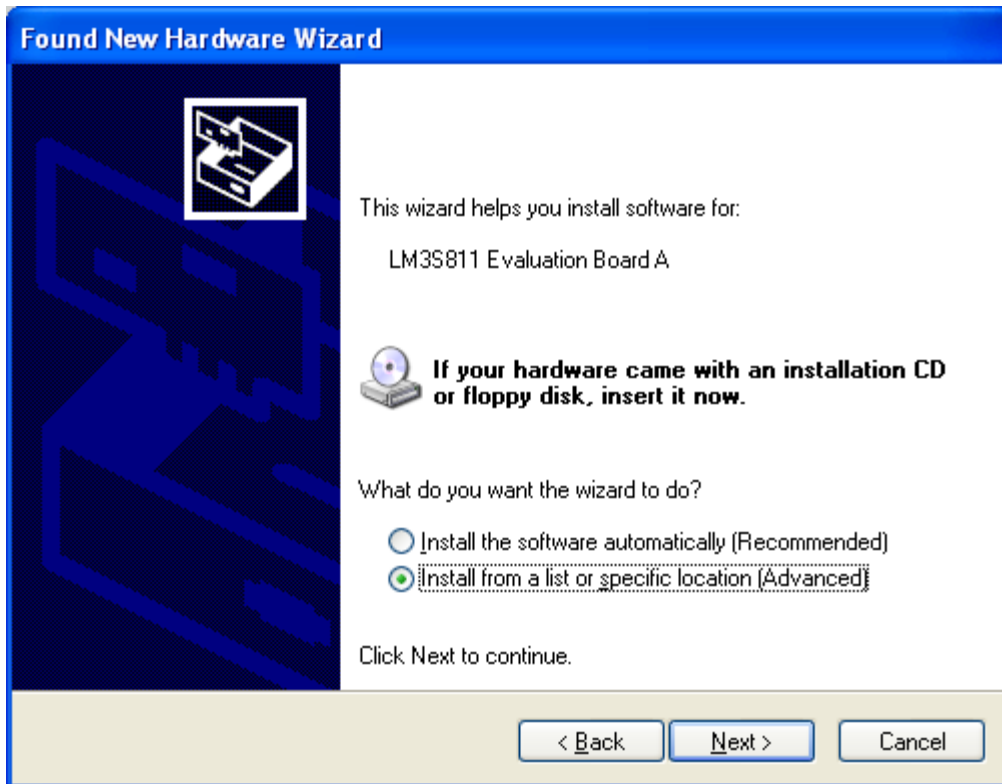
When you plug in the EVB for the first time, Windows starts the Found New Hardware Wizard and asks if Windows can connect to Windows Update to search for software. Select “No, not this time” and then click Next.



# EKK-LM3S811 QUICKSTART



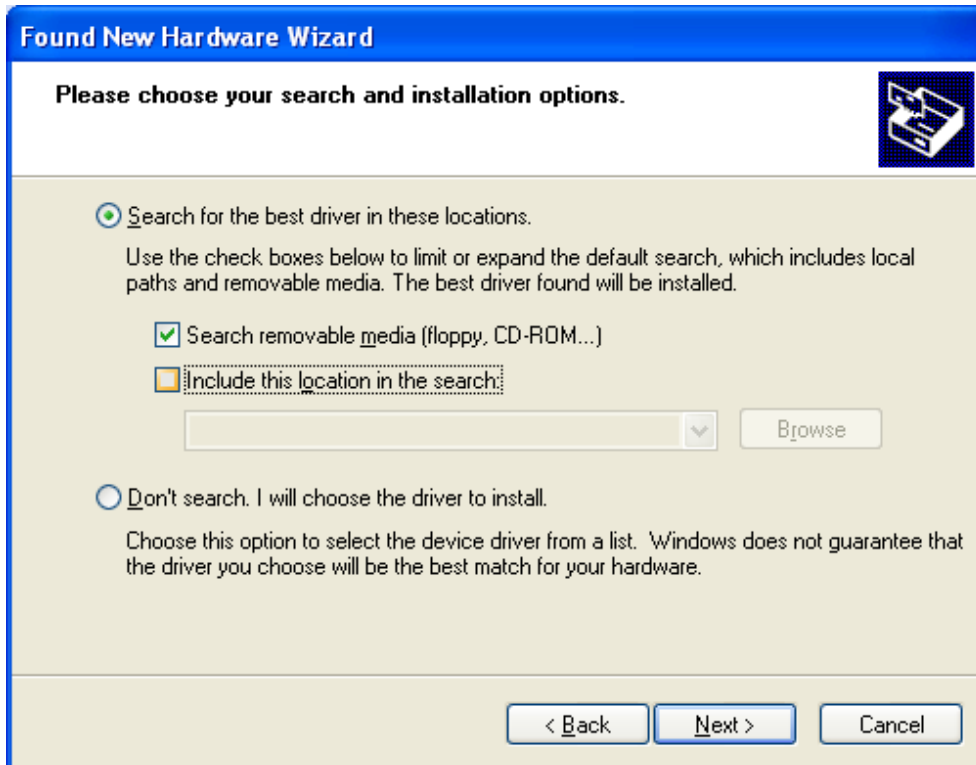
Next, the Found New Hardware Wizard asks you from where to install the software. Select “Install from a list or specific location (Advanced)” and click Next.



# EKK-LM3S811 QUICKSTART



Make sure the “Documentation and Software” CD that came with the Evaluation Kit is in your CD-ROM drive. Select “Search for the best driver in these locations,” and check the “Search removable media (floppy, CD-ROM...)” option. Click Next.

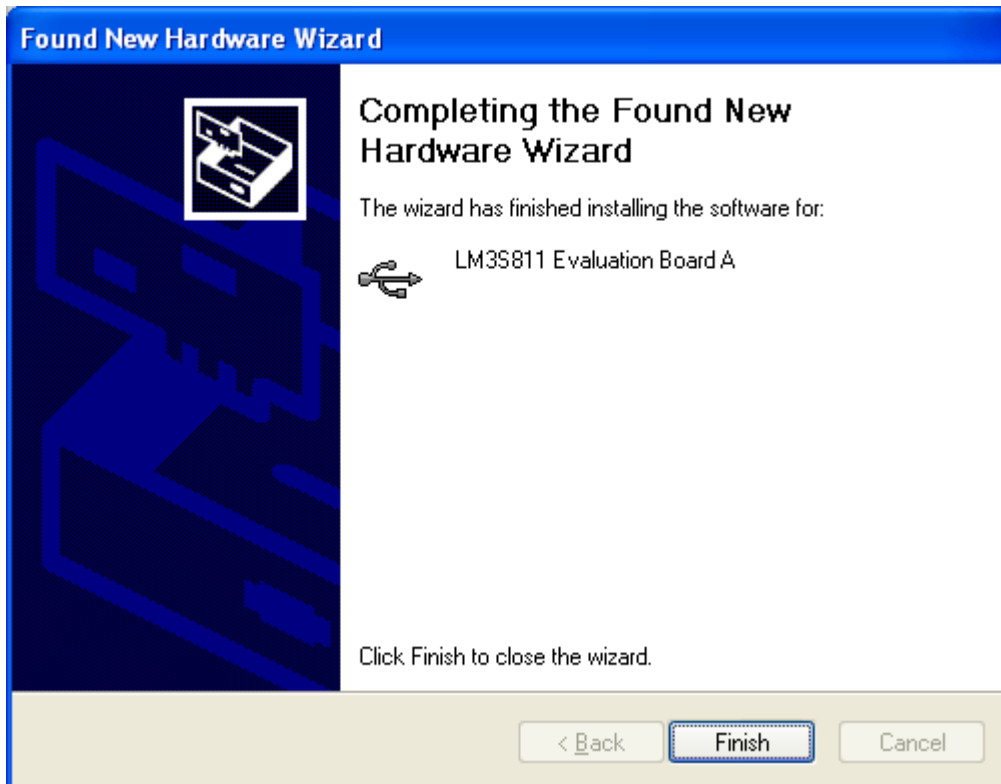


A warning pops up during the Hardware Installation like the one below; click Continue Anyway.





Windows finishes installing the drivers for “LM3S811 Evaluation Board A.” When the driver install is finished, the Found New Hardware Wizard window appears like the one below. Click Finish to close the dialog box.



You have just installed the drivers for “LM3S811 Evaluation Board A.” The USB device built into the EVB is a composite USB device. After you click Finish, a new Found New Hardware Wizard appears asking to install drivers for another device. This is for the “LM3S811 Evaluation Board B” part of the composite USB device. Follow the same instructions as above to install the drivers for this device.

The Found New Hardware Wizard appears one last time. This is to install the drivers for the “LM3S811 Virtual COM Port.” Again, follow the same instructions to install the drivers for this device.

Now all of the hardware drivers for the LM3S811 Evaluation Board have been installed. These drivers give the debugger access to the JTAG interface and the host PC access to the Virtual COM Port.

## Quickstart Application

The LM3S811 Evaluation Board comes preprogrammed with a quickstart application. Once you have powered the board, this application runs automatically. You have probably already noticed this running as you installed the drivers. A Luminary Micro and Keil Software splash screen appear on the OLED display for a few seconds before the application begins.

# EKK-LM3S811 QUICKSTART

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The quickstart application is a game in which you navigate a ship through an endless tunnel. Use the potentiometer (POT) to move the ship up and down, and the user pushbutton (USER) to fire a missile to destroy obstacles in the tunnel. Score accumulates for survival and destroying obstacles. The game lasts for only one ship; the score displays at the end of the game.

Since the OLED display on the evaluation board has burn-in characteristics similar to a CRT, the application also contains a screen saver. The screen saver only becomes active if two minutes have passed without the user pushbutton being pressed while waiting to start the game (that is, the screen saver never appears during game play). An implementation of the Game of Life is run with a field of random data as the seed value.

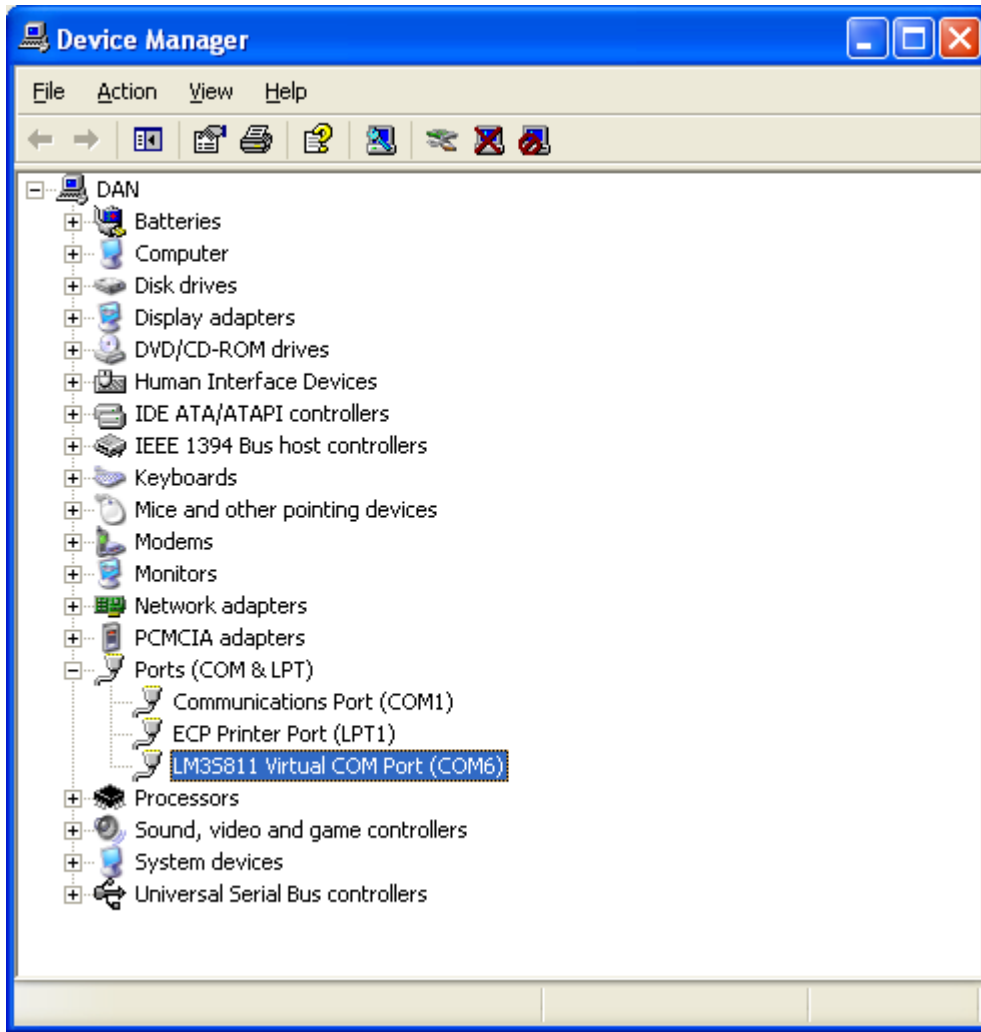
After two minutes of running the screen saver, the display turns off and the user LED blinks. Exit either mode of screen saver (Game of Life or blank display) by pressing the user pushbutton (USER). Press the button again to start the game.

While the game is being played, a running tally of the score is output through UART0 of the LM3S811 microcontroller. UART0 is connected to the FTDI's second serial channel. This serial channel is available to Windows as a Virtual COM port. To view the score, open up a terminal application such as HyperTerminal. Connect using COM#, where # is the number Windows has assigned the Virtual COM port. Set the serial connection to a baud rate of 115200, 8 data bits, no parity, 1 stop bit, and no flow control.

To determine which COM# Windows has assigned to the Virtual COM port on the LM3S811 microcontroller, follow these steps:

- 1) From the Start Menu, select Control Panel, then double-click the System icon.
- 2) Select the Hardware tab.
- 3) Click on the Device Manager button.
- 4) Click on the + symbol to expand the Ports (COM & LPT) group.
- 5) "LM3S811 Virtual COM Port (COM#)" is listed as shown in the figure below. This COM# is the device you connect to using your terminal application. In this example, the COM port is COM6.

# EKK-LM3S811 QUICKSTART





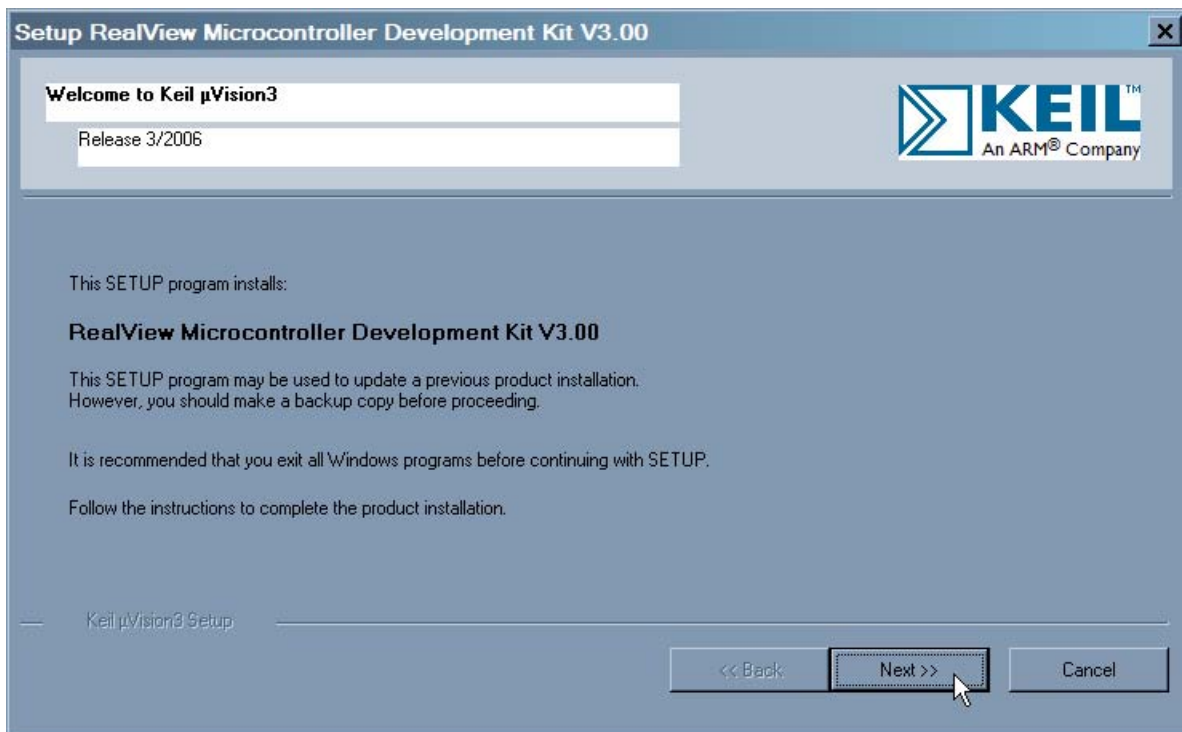
## Keil™ RealView® MDK-ARM

These next steps show you how to install the evaluation version of the Keil RealView Microcontroller Development Kit for ARM controllers (MDK-ARM), and then how to use it to build and run an example application on the Stellaris® LM3S811 Evaluation Board.

### Installing and Using the RealView MDK

#### Step 1: Install the RealView MDK Tools

1. Insert the Evaluation Kit Documentation and Software CD into the CD-ROM drive of your computer. If Autoplay is enabled on your PC, this automatically opens up the index.htm file in your default web browser. If not, use Windows Explorer to open it manually.
2. Click on the Tools button and then the Keil Logo to start the setup program. If the setup program does not start, use Windows Explorer to view the files on the CD, and double-click the setup file located in the Tools\Keil\ directory.
3. The RealView MDK setup program opens. Click Next.



4. You are presented with a license agreement. Read the agreement, and if you agree, check the “Agree” box, and then click Next.



5. Enter a destination folder for the installation or keep the default of C:\Keil. Then click Next.

The screenshot shows the 'Setup RealView Microcontroller Development Kit V3.00' dialog box. The title bar includes a close button (X). The main area is titled 'Folder Selection' and contains a text box with the instruction 'Select the folder where SETUP will install files.' To the right is the KEIL logo with the text 'An ARM® Company'. Below this, it states: 'SETUP will install μVision3 in the following folder. To install to this folder, press 'Next'. To install to a different folder, press 'Browse' and select another folder.' A 'Destination Folder' text box contains 'C:\Keil' and a 'Browse ...' button is to its right. At the bottom, there are three buttons: '<< Back', 'Next >>', and 'Cancel'. The text 'Keil μVision3 Setup' is visible in the bottom left corner.

6. Enter your customer information and then click Next.

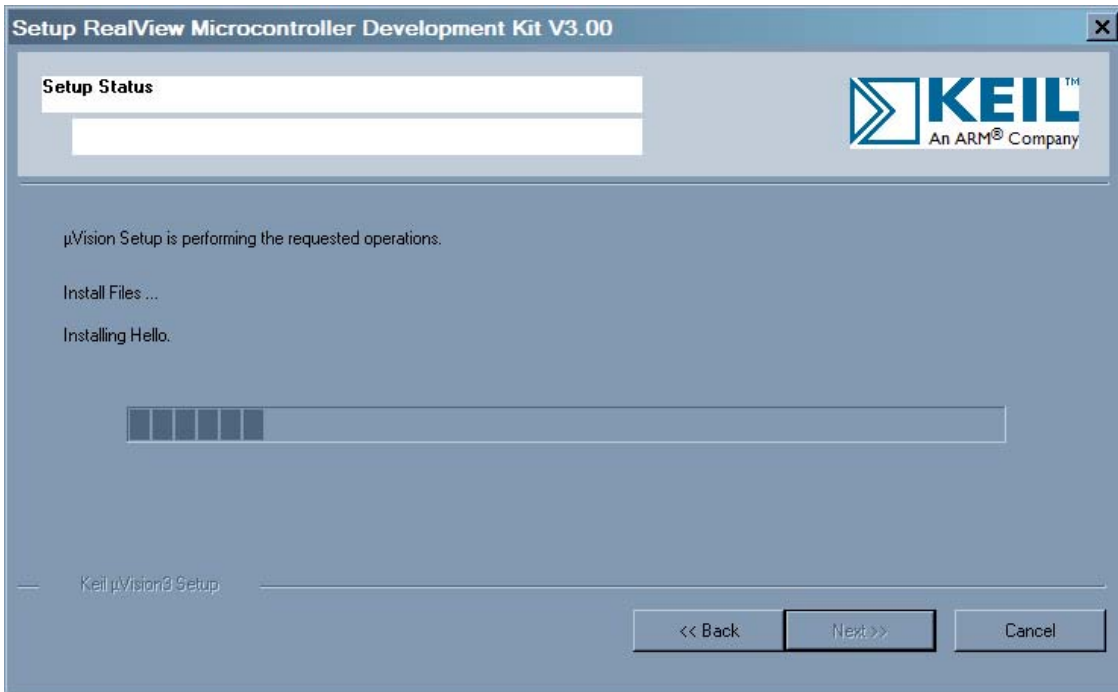
The screenshot shows the 'Setup RealView Microcontroller Development Kit V3.00' dialog box. The title bar includes a close button (X). The main area is titled 'Customer Information' and contains a text box with the instruction 'Please enter your information.' To the right is the KEIL logo with the text 'An ARM® Company'. Below this, it states: 'Please enter your name, the name of the company for whom you work and your E-mail address.' There are four text input fields: 'First Name:' with 'Joe', 'Last Name:' with 'Customer', 'Company Name:' with 'Anycorp, Inc.', and 'E-mail:' with 'joecustomer@anycorp.com'. At the bottom, there are three buttons: '<< Back', 'Next >>', and 'Cancel'. A mouse cursor is pointing at the 'Next >>' button. The text 'Keil μVision3 Setup' is visible in the bottom left corner.



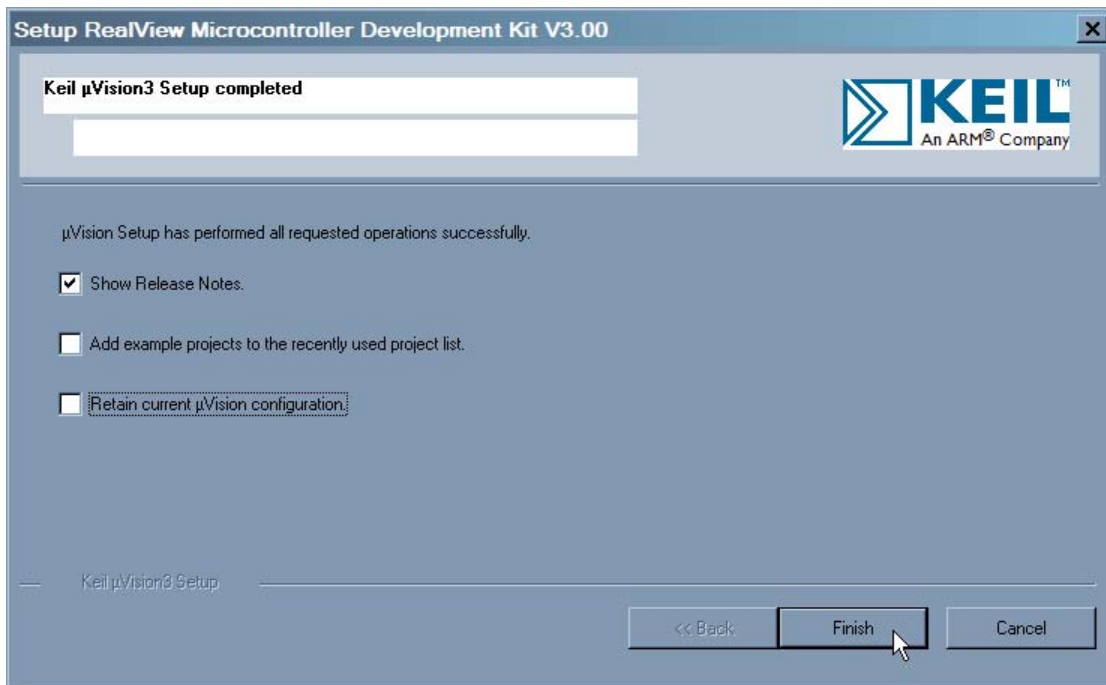
# EKK-LM3S811 QUICKSTART



7. After you click Next, the setup program begins installing files, and a progress bar shows in the window.



8. Wait for the install to complete. Then you see some final choices. Leave the “Release Notes” checked if you want to see the Release Notes, clear any other checkboxes and click Finish. Note that the “Retain” choice shown below may not appear.

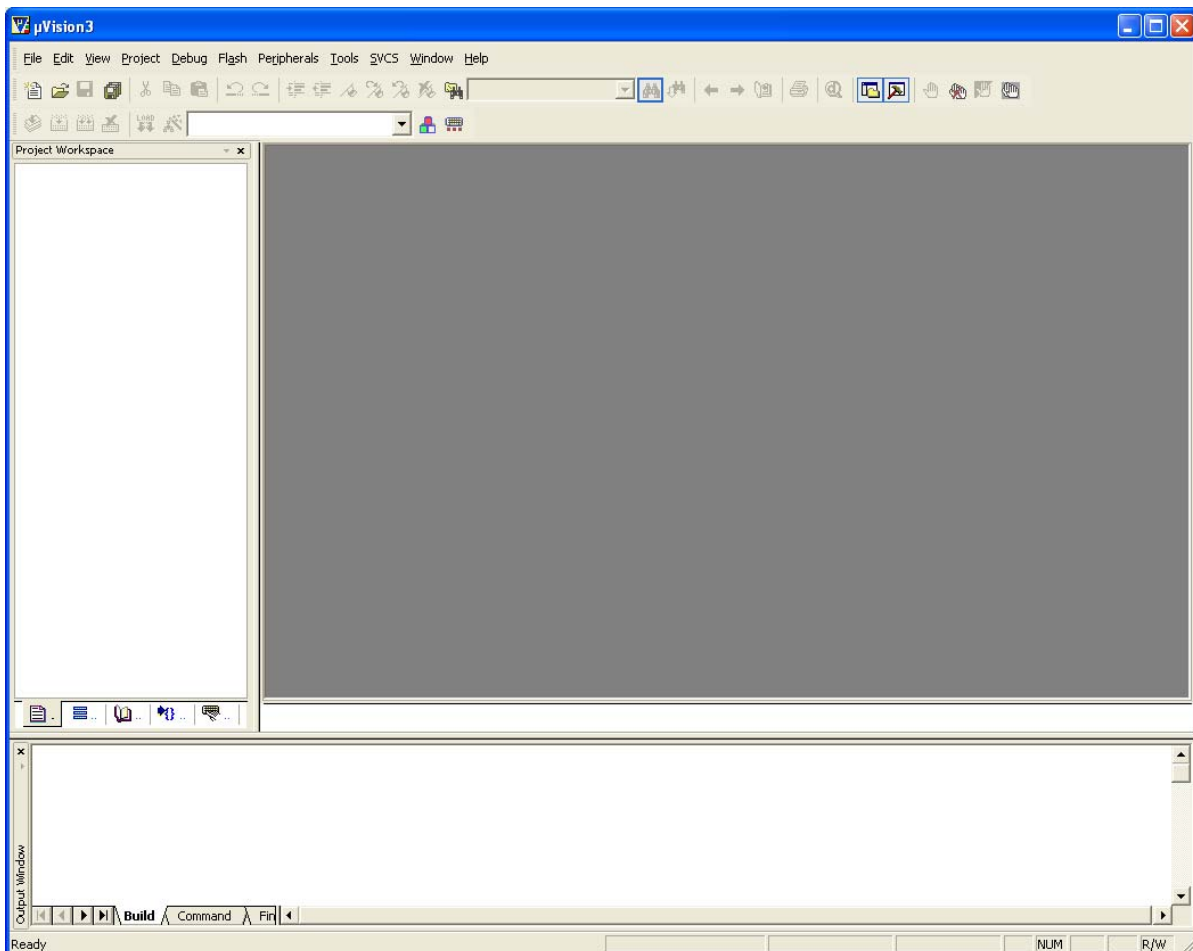




9. If you selected “Show Release Notes” in the previous step, the Release Notes open on your monitor. Close the Release Notes window when you are finished reading them.
10. The RealView MDK is now installed on your computer. You should have a  $\mu$ Vision icon on your desktop and in your Windows Start Menu.

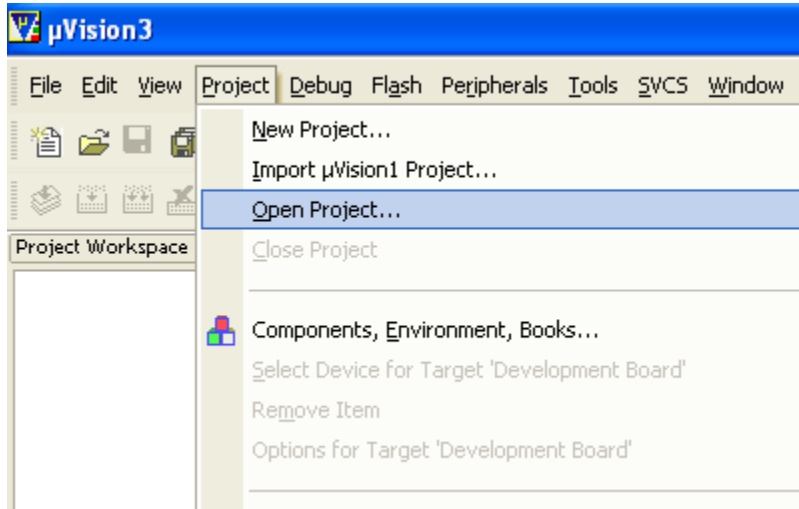
## Step 2: Start the Keil $\mu$ Vision IDE and Load the Hello Project

1. Start the Keil  $\mu$ Vision IDE by double-clicking the icon on your desktop, or by selecting it from the Windows Start Menu. You may see a blank  $\mu$ Vision IDE window or one with a project.



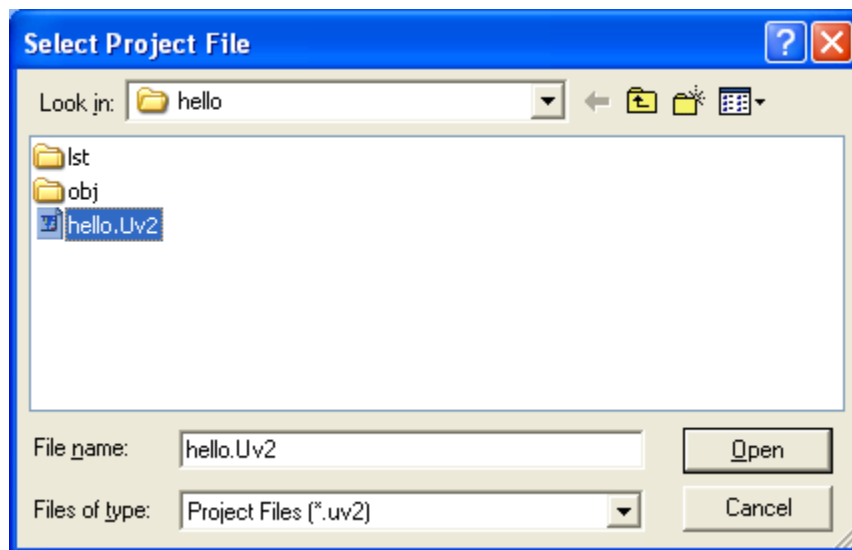


2. From the Project menu, select “Open Project.”



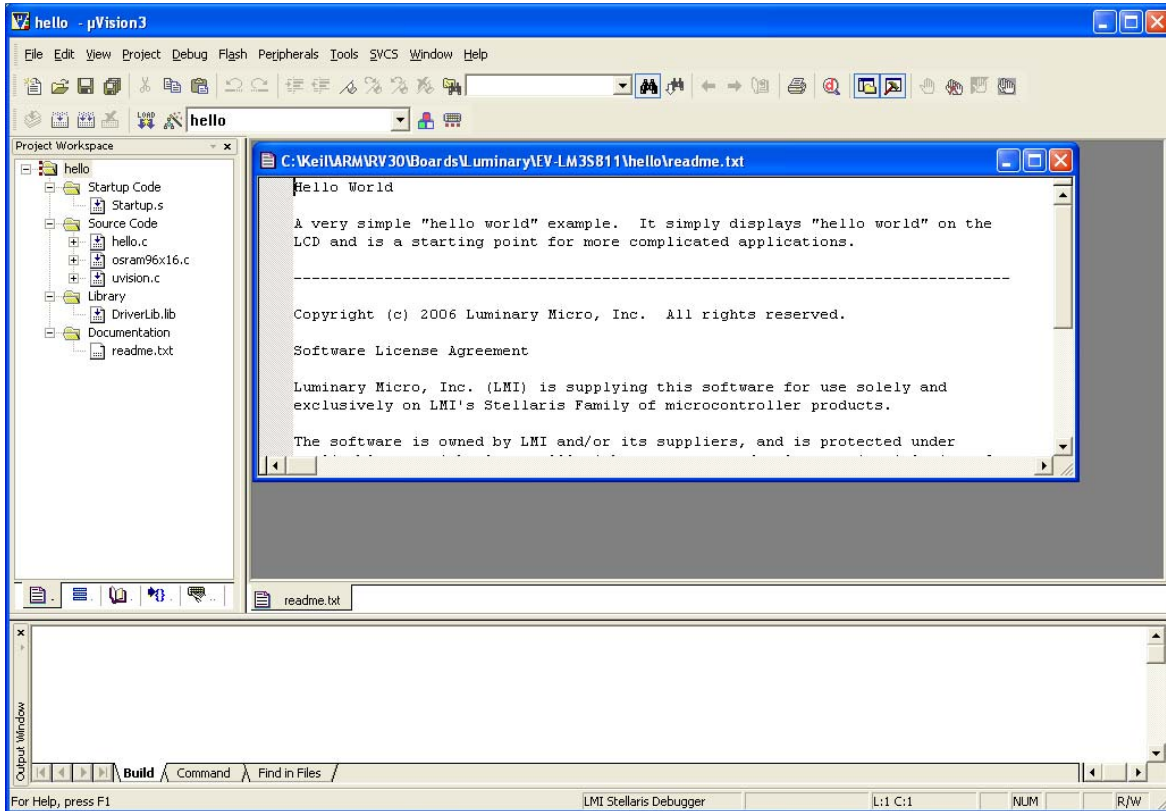
3. Use the dialog box to navigate to the Hello program in the directory appropriate for your Stellaris® controller. From the location where you installed the Keil tools (default of C:\Keil), the Hello project is located in:

(C:\Keil)\ARM\RV30\Boards\Luminary\EV-LM3S811\hello

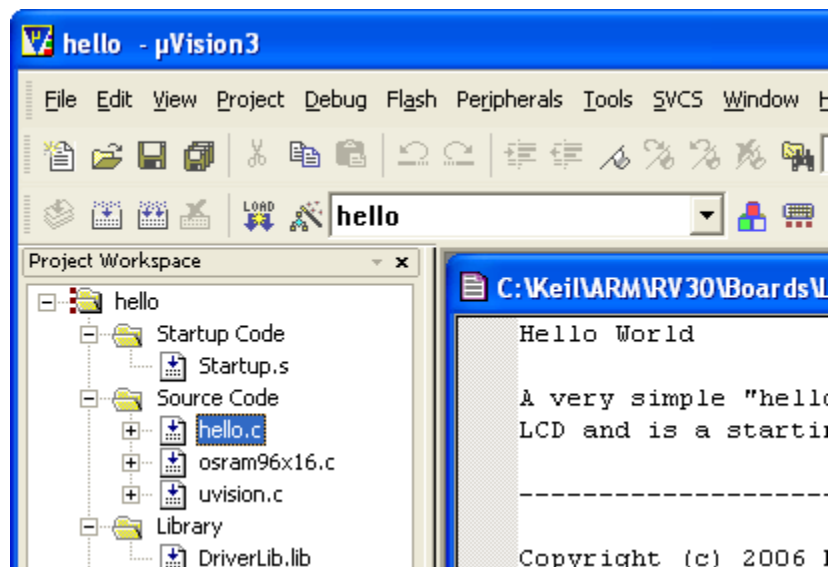




4. Select the hello.Uv2 project file and click Open. The project opens in the IDE.



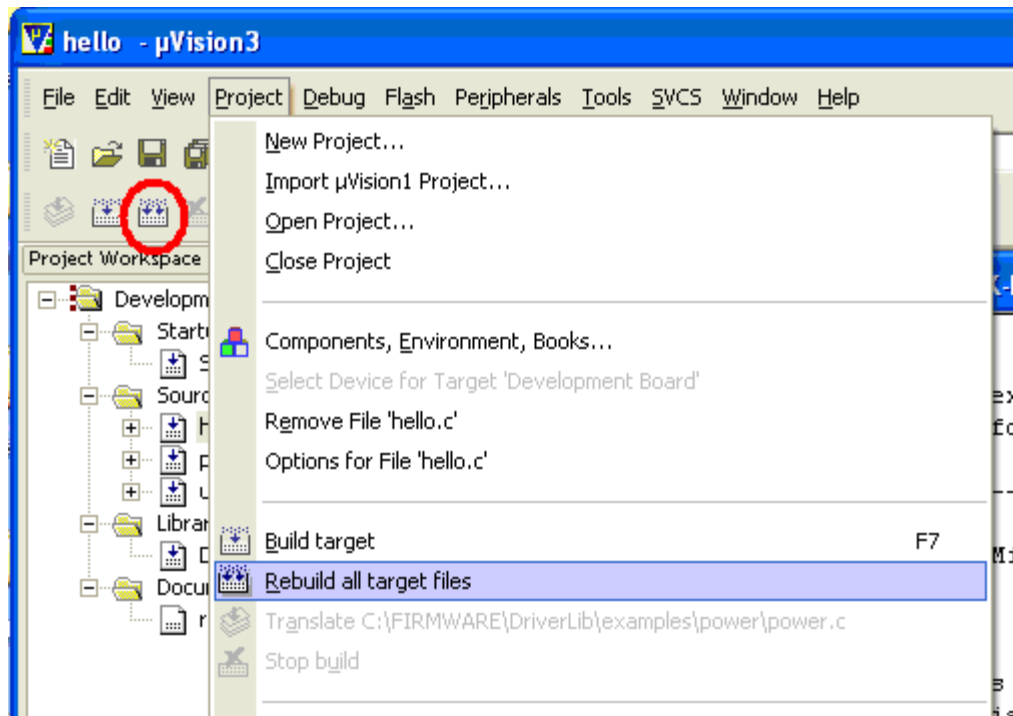
5. You can view source files in the project by double-clicking on a filename in the Project Workspace pane on the left. For example, double-click on main.c, and the source file opens in the editor.



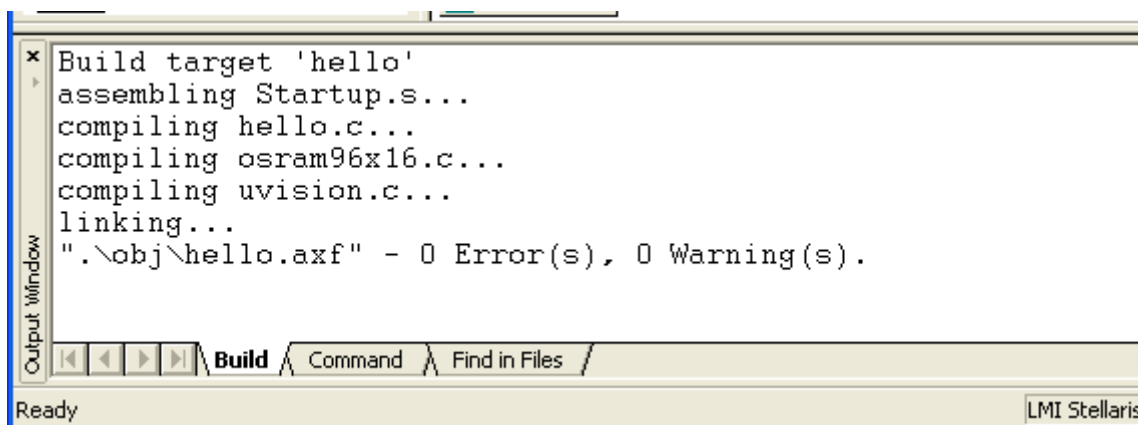


## Step 3: Build the Hello Project

1. Select “Rebuild all target files” from the Project menu, OR click on the “Rebuild all” button (icon).



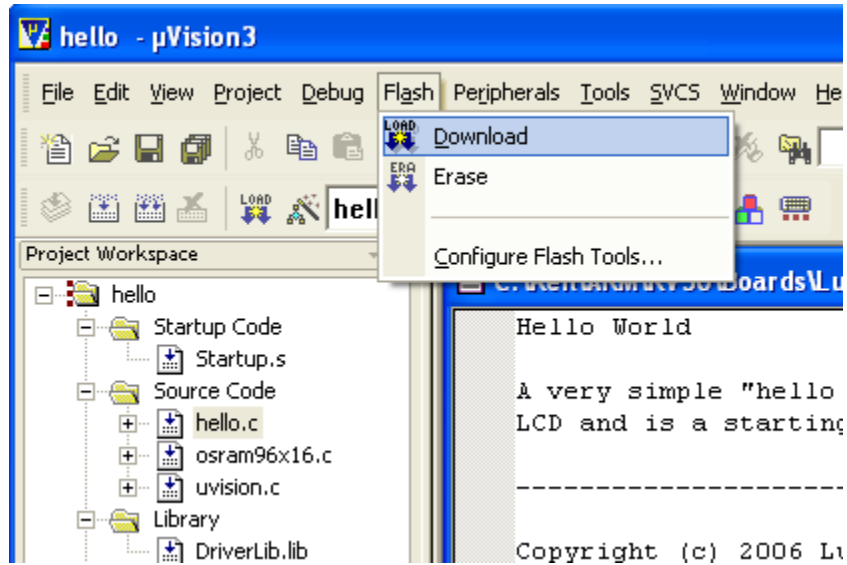
2. All of the source files are compiled and linked. The activity can be seen in the Build window at the bottom of the µVision IDE. The process completes with an application named hello.axf built with no errors and no warnings.



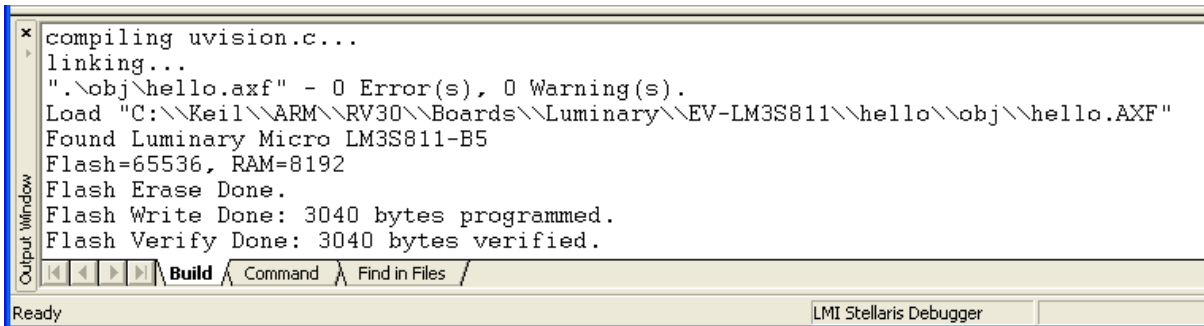


## Step 4: Load the Hello Program into the Flash Memory

1. Select “Download” from the Flash menu, OR click on the “Download” button (icon).



2. The process takes a few seconds. You see a progress bar at the bottom of the IDE window as the device is programmed. When it is finished, you should see in the Build window that the device was erased, programmed, and verified OK.

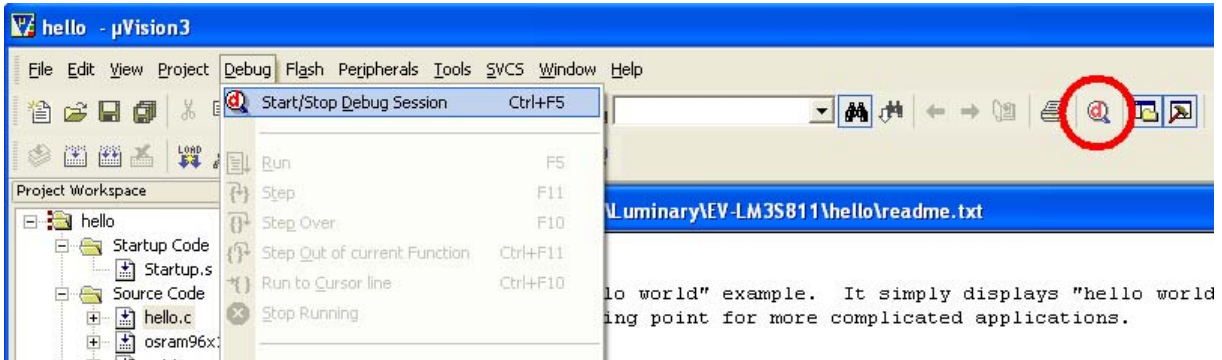


3. The Hello application is now programmed into the flash memory of the Luminary Micro microcontroller on the Evaluation Board.

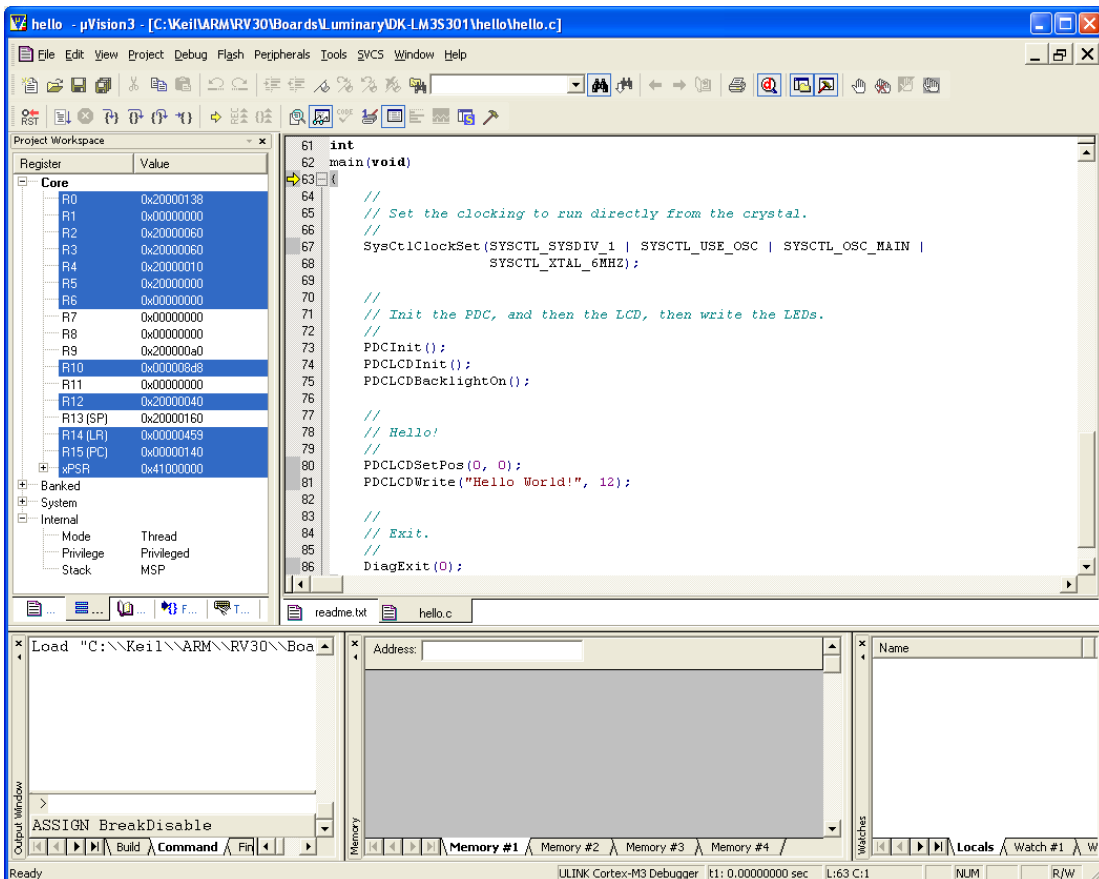


## Step 5: Debug and Run the Hello Program

1. Select “Start/Stop Debug Session” from the Debug menu, OR click the “Debug” button (icon).

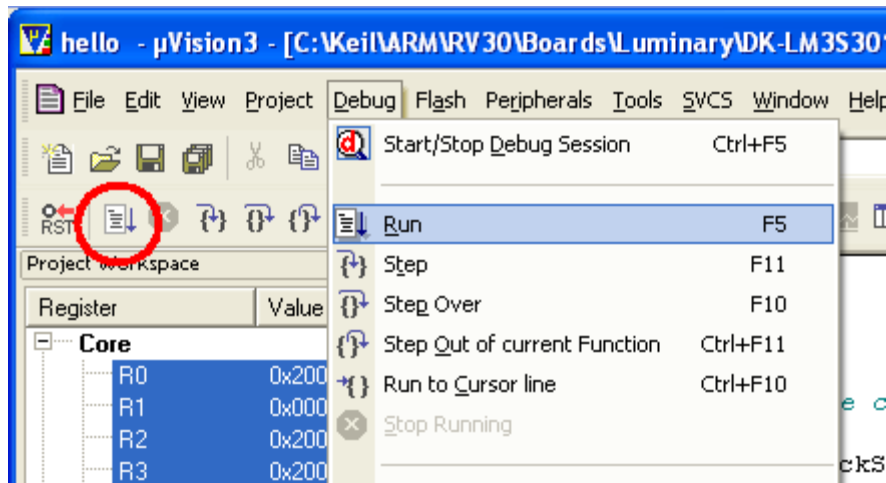


2. The IDE switches to debugging mode. The processor registers show up in a window on the left, the debugger command window is visible at the bottom, and the main window shows the source code being debugged. The debugger automatically stops at main.





- From here, you can examine and modify memory, program variables, and processor registers, set breakpoints, single step, and all other typical debugging activities. To run the program, select “Run” from the Debug menu, OR click on the “Run” button (icon).



- The application starts running and a “Hello World!” message appears in the OLED display.

## Step 6: Build and Run Additional Example Programs

There are several additional example project folders under the folder:

Boards\Luminary\EV-LM3S811

These additional example programs are discussed in the *Stellaris® Peripheral Driver Library User’s Guide* (found on the Software and Documentation CD). You can open, build, and run any of these in the same way by going back to Step 2 and opening a different project.

## Conclusion

You have now installed the Keil RealView Microcontroller Development Kit, and used it to build, load, and run a demonstration application on the Stellaris® LM3S811 Evaluation Board. From here, you can experiment with the debugger or start creating your own application using the Hello program as an example.





## References

The following references are included on the Stellaris® LM3S811 Evaluation Kit Documentation and Software CD and are also available for download at [www.luminarymicro.com](http://www.luminarymicro.com):

- *Stellaris® LM3S811 Evaluation Kit User's Manual*
- Stellaris® Peripheral Driver Library, Order Number SW-DRL
- *Stellaris® Family Driver Library User's Manual*
- *Stellaris® LM3S811 Microcontroller Data Sheet*

In addition, the following website may be useful:

- RealView MDK website at <http://www.keil.com/arm/rvmdkkit.asp>

## Support Information

For support on Luminary Micro products, contact:

[support@luminarymicro.com](mailto:support@luminarymicro.com)

+1-512-279-8800, ext. 3

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