Application Report
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Debugging DriverLib in ROM on MSP432P4xx

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ABSTRACT

The MSP432P4xx family includes a complete peripheral driver library (DriverLib) fully integrated into the ROM memory. Developers can leverage the ROM DriverLib for multiple benefits including access to highly robust and tested APIs, single-cycle ROM execution speed at lower power consumption, and freeing up memory space for additional application code. Developers can gain access to ROM APIs by adding DriverLib header file to their projects and linking to a prebuilt library. However, to step into and view the ROM code and disassembly, a few extra steps are needed. This application report details the steps to start a new project with ROM debugging or to add ROM debugging capability to an existing project and how to debug with ROM in the Code Composer Studio™ IDE (CCS).

For more information on MSP432P4xx Driver Library and what is provided in ROM DriverLib, refer to the MSP432P4xx Driver Library. [1]

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1 Add ROM Source and Symbol to an MSP432™ Project

The first step to enable ROM debugging is to include the ROM source code and the binary ROM symbol to your project. Both of these files are provided inside an empty project template located inside TI Resource Explorer within CCS when you have MSPWare 2.00.00 or newer installed [2]. See Figure 1 for a view showing the template project in TI Resource Explorer. The code is also available as a stand-alone download from www.ti.com/lit/zip/slaa663.

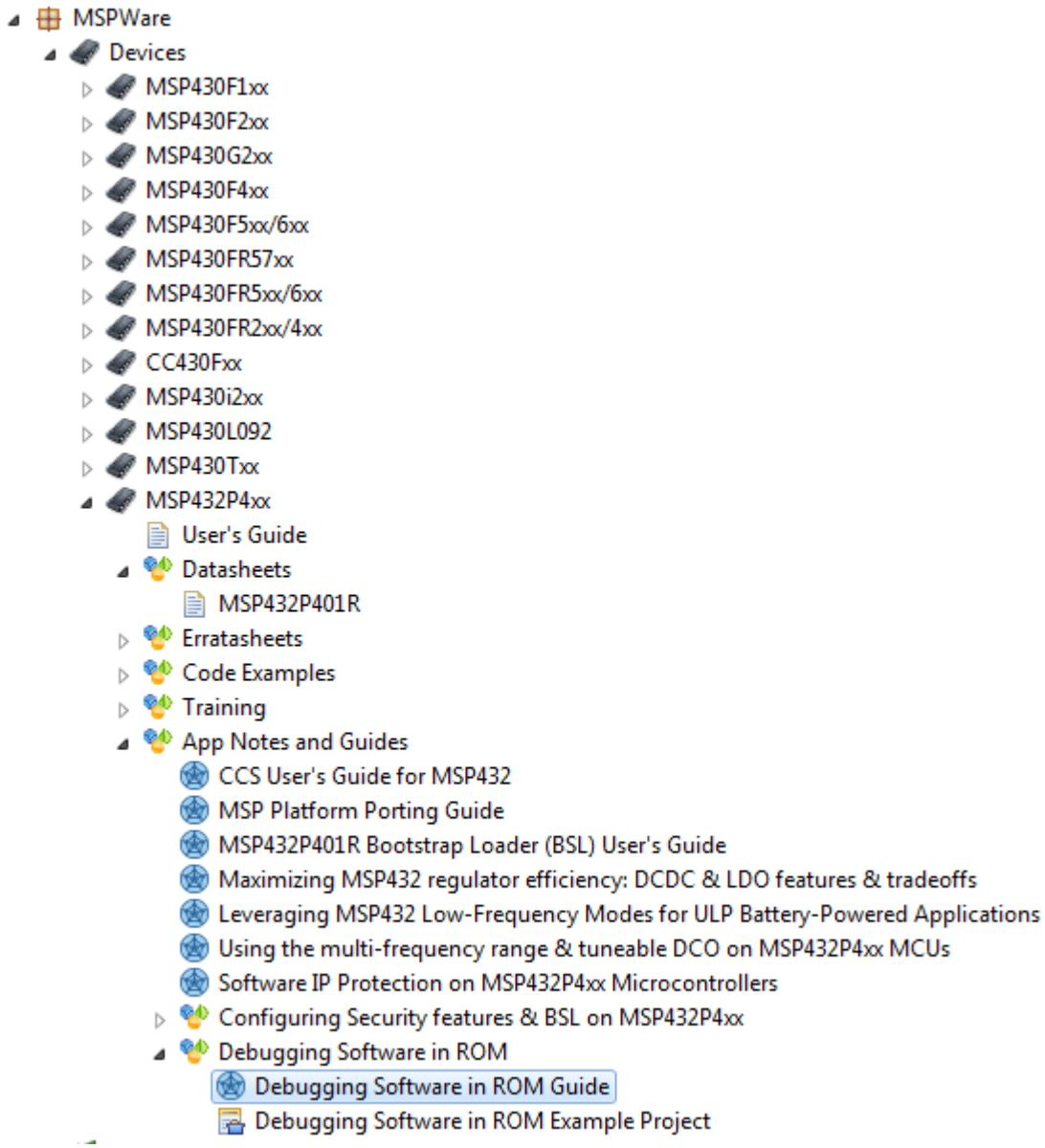

Figure 1. Debugging Software in ROM Example Project

If you select the project from TI Resource Explorer inside CCS, you can directly import the project into the CCS workspace. Alternatively, the project from the separate zip file download can also be imported into CCS using the *Project* > *Import CCS Projects ….* menu option.

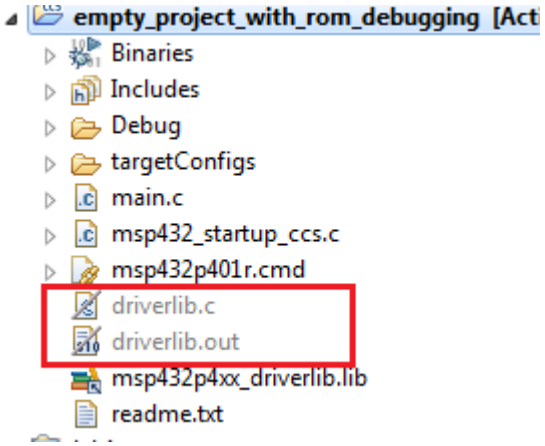

Figure 2. empty_project_with_rom_debugging

This template project, **empty_project_with_rom_debugging**, provides both ROM source and symbol files as well as a simple example to demonstrate how to debug in ROM. Two key files, are highlighted in Figure 2:

- driverlib.c: This is the source for the ROM DriverLib. When ROM debugging is enabled, this source code is used to correlate to the disassembly window.
- driverlib.out: This is the binary output of the DriverLib that was used to program into the MSP432P4xx ROM memory. Full symbols for the APIs are also included, enabling users to correlate the binary code for each function back to the source code.

These two files are marked as "exclude from build" to tell the CCS compiler to exclude them from compilation. If you intend to start a new project, this empty template is a good starting point. If you want to add ROM debugging to an existing project, simply copy the two files, *driverlib.c* and *driverlib.out*, from this project to your project.

2 Load ROM Symbol and Source Into Debug

Step 1: Start the debug process as normal. In CCS, click on the debug symbol to start the debug process.

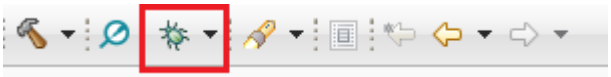

Figure 3. Start Debugging

Step 2: Remove all symbols: *Run* > *Load* > *Remove All Symbols*

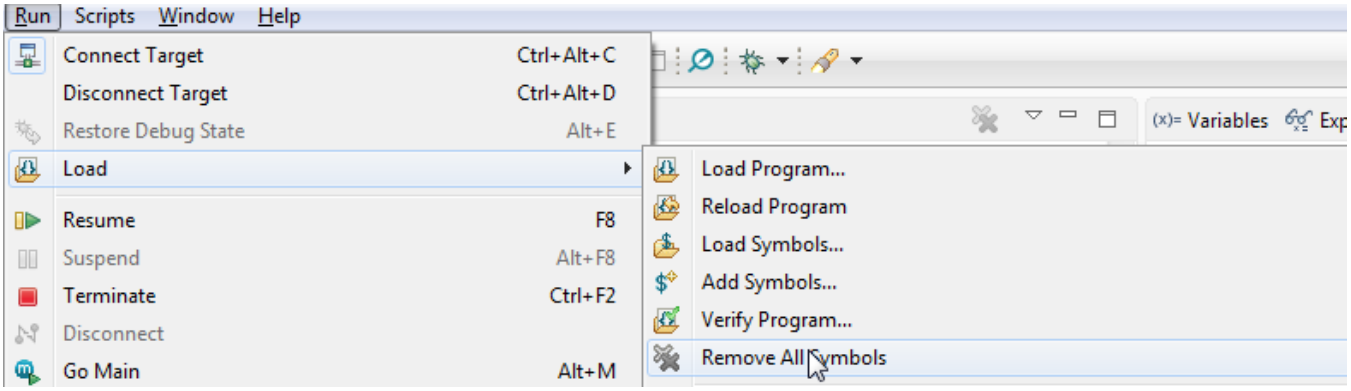

Figure 4. Remove All Symbols

Step 3: Add DriverLib ROM symbol first: *Run* > *Load* > *Add Symbol* >

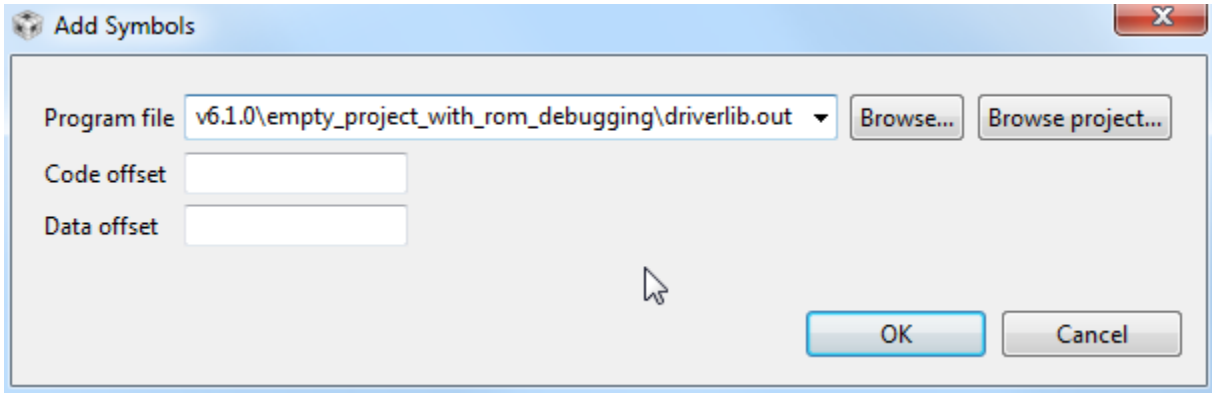

Figure 5. Add DriverLib Symbol

Step 4: Add project symbol last: *Run* > *Load* > *Add Symbol* >

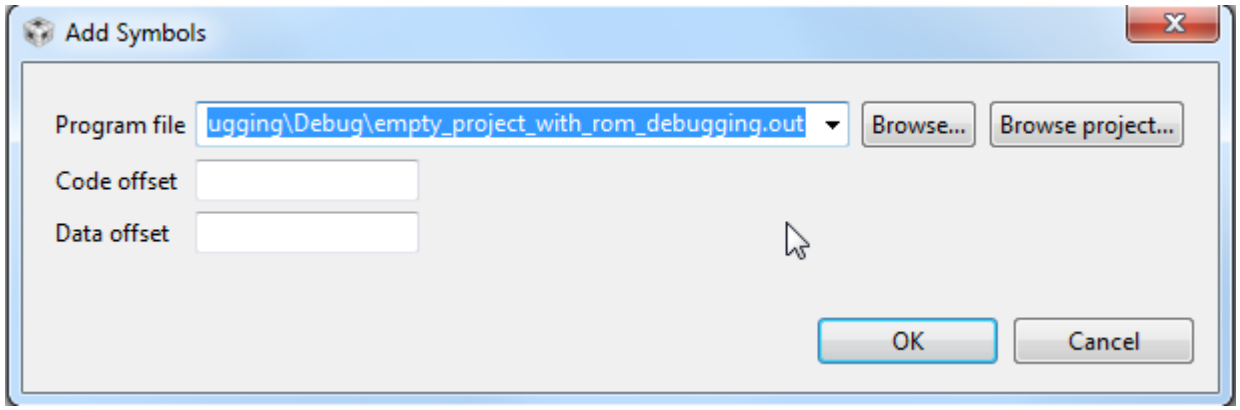

Figure 6. Add Project Symbol

Step 5: Now you can step into an ROM API for debugging.

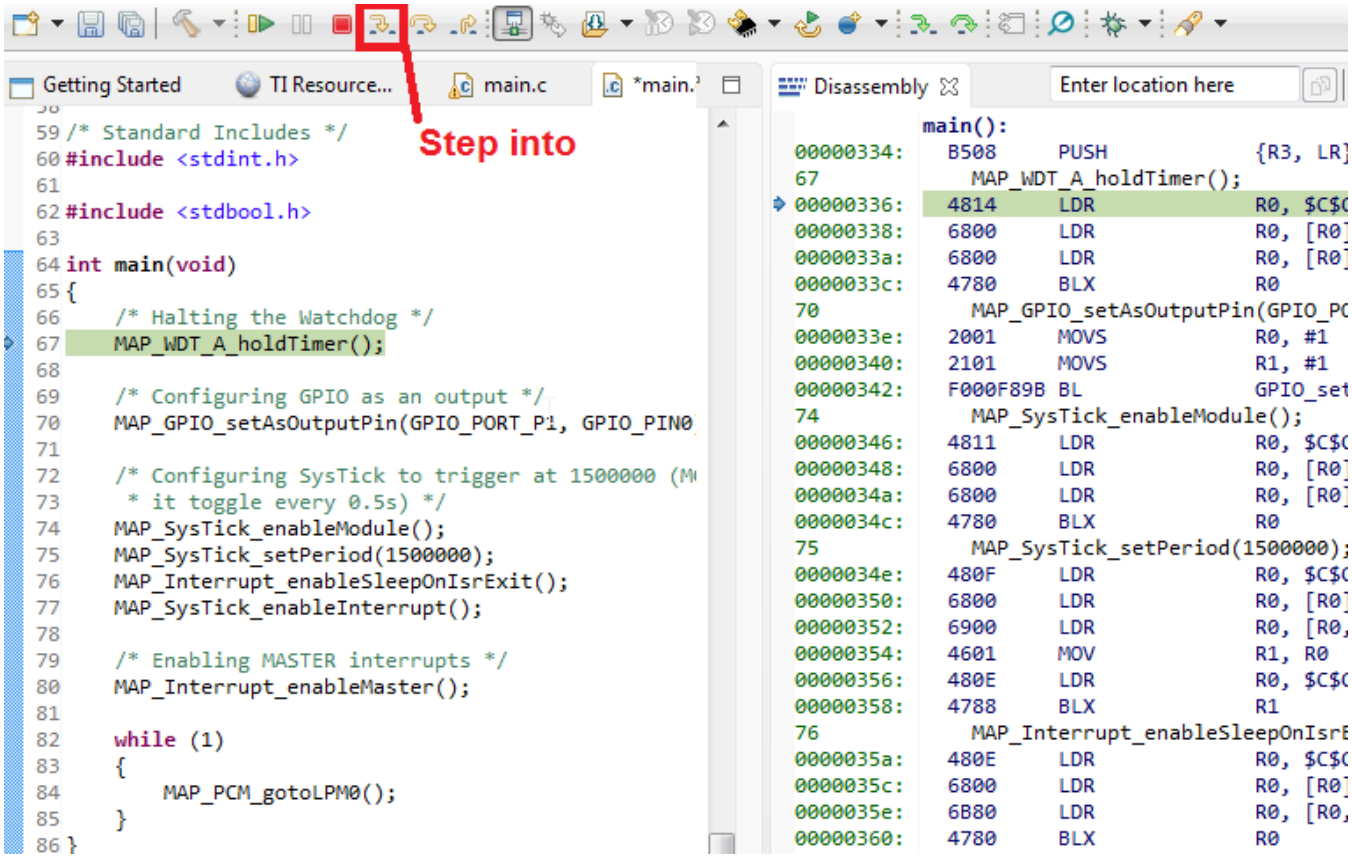

Figure 7. Stepping Into a ROM Function

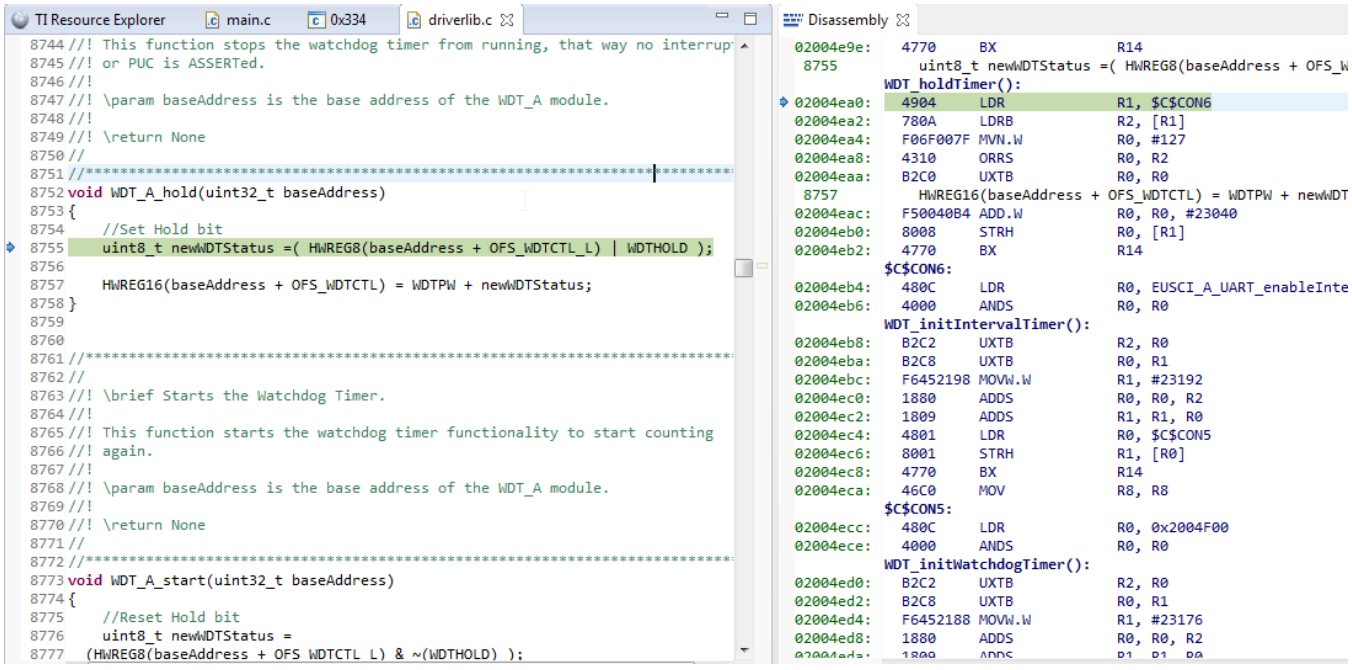

Figure 8. Debugging a Function in ROM Address Space

3 References

1. MSP432P4xx Driver Library (www.ti.com/tool/mspdriverlib)
2. MSPWare (www.ti.com/tool/mspware)

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