Accessing the DSP on the OMAP-L138 SOM-M1
Application Note 422

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Abstract

This Application Note describes how to access the DSP core on the OMAP-L138 SOM-M1 to develop DSP applications.

Revision History

REV	EDITOR	DESCRIPTION	APPROVAL	DATE
A	SV	Initial release	GLJ	12/07/09

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1   Introduction

The OMAP-L138 SOM-M1 is built around the Texas Instruments (TI) dual core OMAP-L138 processor—the processor features an ARM926EJ-S MPU and a TMS320C6748 DSP. By default, the ARM is the boot master and will be enabled on power-up. This Application Note describes how to enable the DSP and connect to it to develop DSP applications.

1.1   Nomenclature

Within this document, the phrase "OMAP-L138 Development Kit" can be assumed to apply to both the OMAP-L138 EVM and the OMAP-L138 eXperimenter Kit.

2   Connect to DSP

2.1   Wake DSP Register Setup

The PSC0 Module Control 15 Register (*PSC0.MDCTRL15*) controls the state of the DSP. To enable the DSP, this register needs to be properly configured by setting the specific bits outlined below. Follow the state transition procedure found in Section 8.3.2 of the TI's *OMAP-L138 Applications Processor System Reference Guide* (Rev. C) to ensure the DSP properly transitions between states.

- Set *Module next state* of *PSC0.MDCTRL15* to *Enable state* (*PSC0.MDCTRL15.NEXT* = 3h)
- Set *Module local reset control* of *PSC0.MDCTRL15* to *De-assert local reset* (*PSC0.MDCTRL15.LRST* = 3h)

2.2   Connection Steps

There are a couple methods for updating the register settings outlined above and then connecting to the DSP core of the OMAP-L138 SOM-M1. Both methods use Code Composer Studio (CCS) to communicate with the core, but the methods differ depending on whether the on-board XDS100 emulation circuitry or an external emulator is used.

2.2.1   On-Board Emulation with Code Composer Studio

The on-board emulation circuitry on the development kit baseboard only supports communication with the DSP core of the OMAP-L138. Since the ARM MPU is the boot master, the boot code must first wake the DSP to allow the user to connect to it. This wake function is performed by the U-Boot image that resides in SPI flash on the OMAP-L138 SOM-M1; this function can be enabled/disabled by setting the "dspwake" environment variable (see TI's "OMAP-L138 Getting Started Guide" for more information).

Perform the following steps to connect to the DSP using the XDS100 on-board emulation:

1. Follow the instructions in the corresponding *QuickStart Guide* to connect the Development Kit to the PC.

2. Continue to follow instructions in the *QuickStart Guide* to boot the SOM using SPI1 flash as boot mode.

3. When prompted by U-Boot, press any key to interrupt the autoboot process.

You are now connected to the DSP core of the OMAP-L138 SOM-M1 and can open a sample project or create a new project to begin DSP application development.

2.2.2   External Emulator with Code Composer Studio v3.3 Platinum

Using an external emulator provides the ability to connect to the ARM MPU of the OMAP-L138 SOM-M1. Therefore, the boot code does not need to wake the DSP since it can be handled using a GEL file. The OMAPL138_ARM GEL file supplied with the OMAP-L138 Development Kits provides a function to perform the wake DSP register setup steps; this function, *Wake_DSP()*, is called within *OnTargetConnect()*, so connecting to the ARM core will also make the DSP available for connection. The OMAPL138_ARM GEL file is available on Logic's website at the following location: http://support.logicpd.com/downloads/1236/

To connect to the DSP using an external emulator, follow the steps provided below:

NOTE: These steps were tested with a Spectrum Digital XDS510USB emulator (.\CCStudio_v3.3\boards\drivers\import\OMAPL138_sdxds510usb.ccs). However, the instructions should work for any external emulator provided it can connect to the ARM MPU and is properly configured in the System Configuration of Code Composer Studio Setup to use the GEL files provided with the OMAP-L138 Development Kit.
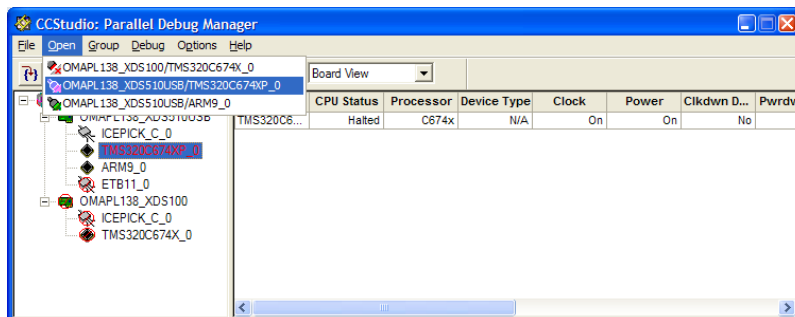
1. Connect the emulator to the baseboard's 14- or 20-pin JTAG header.

2. Power on the development kit.

3. Open Code Composer Studio and Connect to the ARM9 (will execute *OnTargetConnect()*)
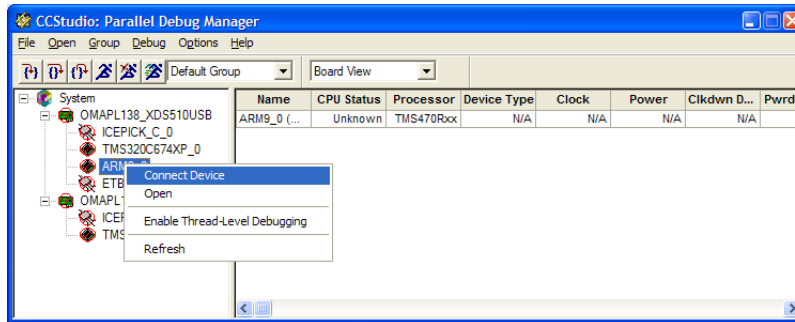
4. Connect to the TMS320C67X
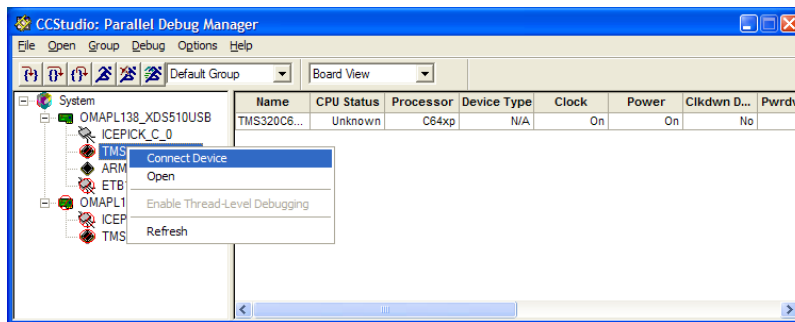
5. Click the "Open" menu item and Select "OMAPL138_XDS510USB/TMS320C674XP_0"

You are now connected to the DSP core of the OMAP-L138 SOM-M1 and can open a sample project or create a new project to begin DSP application development.

Appendix A: Additional Documentation References

The following documents or documentation resources are referenced within this Application Note or provide additional information regarding the OMAP-L138 Development Kits.

- TI's *OMAP-L138 Applications Processor System Reference Guide* (Rev. C)
  http://focus.ti.com/general/docs/litabsmultiplefilelist.tsp?literatureNumber=sprugm7c

- TI's *OMAP-L138 Low-Power Applications Processor Datasheet* (Rev. A)
  http://www.ti.com/lit/gpn/omap-l138

- TI's "OMAP-L138 Getting Started Guide"
  http://wiki.davincidsp.com/index.php/GSG:_OMAP-L138_DVEVM_Additional_Procedures#DSP_wakeup_in_U-Boot

- Logic's *Zoom OMAP-L138 EVM Development Kit QuickStart Guide*
  http://support.logicpd.com/downloads/1230/

- Logic's *Zoom OMAP-L138 eXperimenter Kit QuickStart Guide*
  http://support.logicpd.com/downloads/1213/

- Logic's *Zoom OMAP-L138 Development Kit User Manual*
  http://support.logicpd.com/downloads/1214/