Stellaris® LM3S9B96 Development Kit

The Stellaris LM3S9B96 Development Kit provides a feature-rich development platform to help familiarize the user with Stellaris microcontrollers. The highly integrated LM3S9B96 microcontroller features on-chip Ethernet MAC+PHY, USB OTG, External Peripheral Interface (EPI), and Controller Area Network (CAN), providing flexibility never before seen on ARM-based microcontrollers.

LM3S9B96 Development Board

Requirements

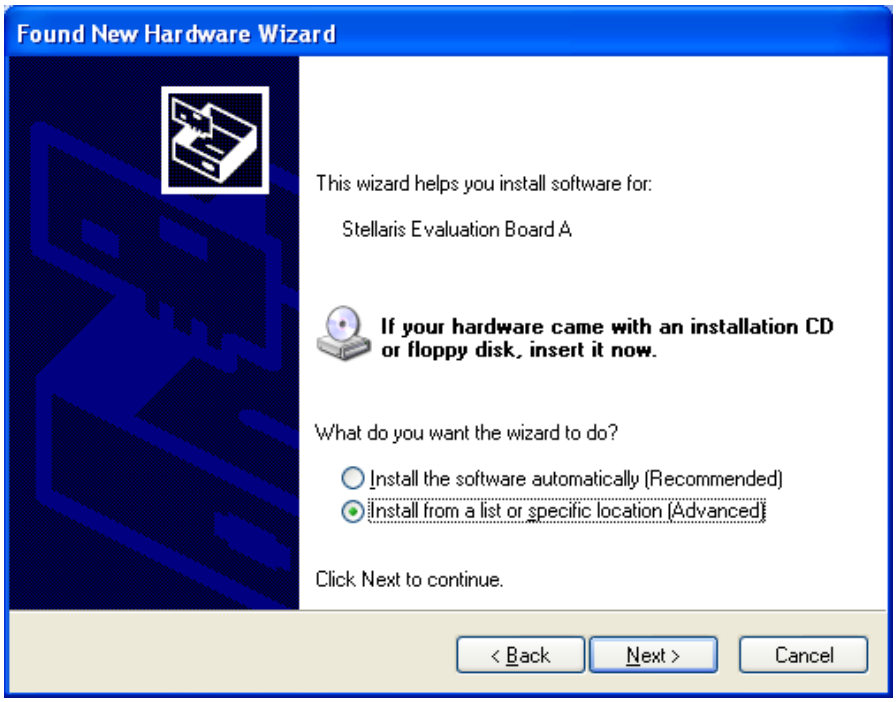
- You have a PC, with a USB interface, running Microsoft® Windows 2000, XP, or Vista
- You have the Stellaris LM3S9B96 Development Kit Documentation and Software CD

Board Set-Up

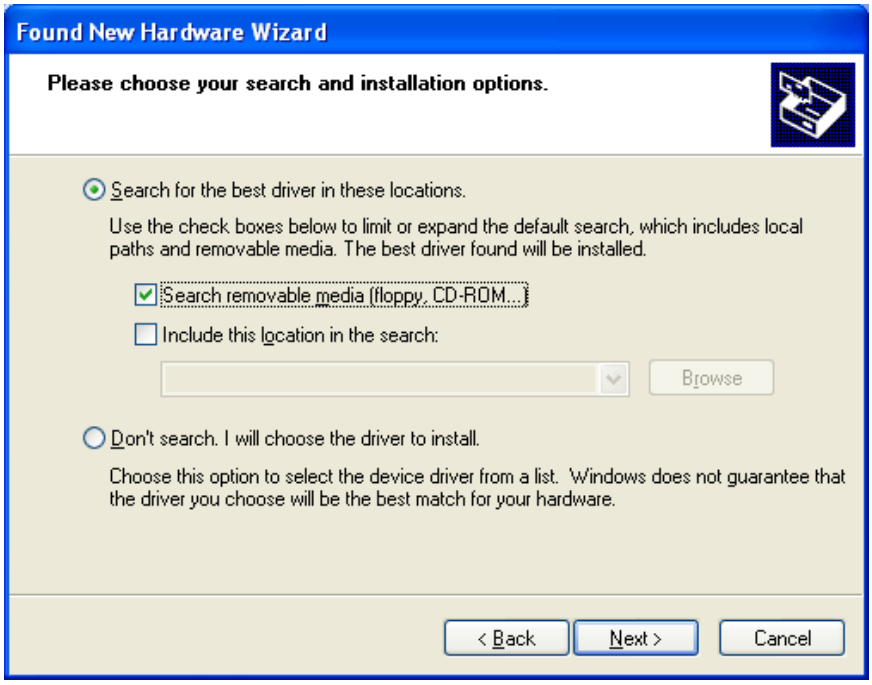
The LM3S9B96 Development Board is configured for immediate use. To power the board, use the 5 V power supply included in the kit. For debug and Virtual COM Port connectivity, use the supplied USB cable (type mini-B) to connect to the “ICDI USB” connector on the upper left corner of the board. Connect the other end (type A) to a free USB port on your host PC. If connecting the board through a USB hub, it must be a powered hub.

When you plug in the debug portion of the board 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.

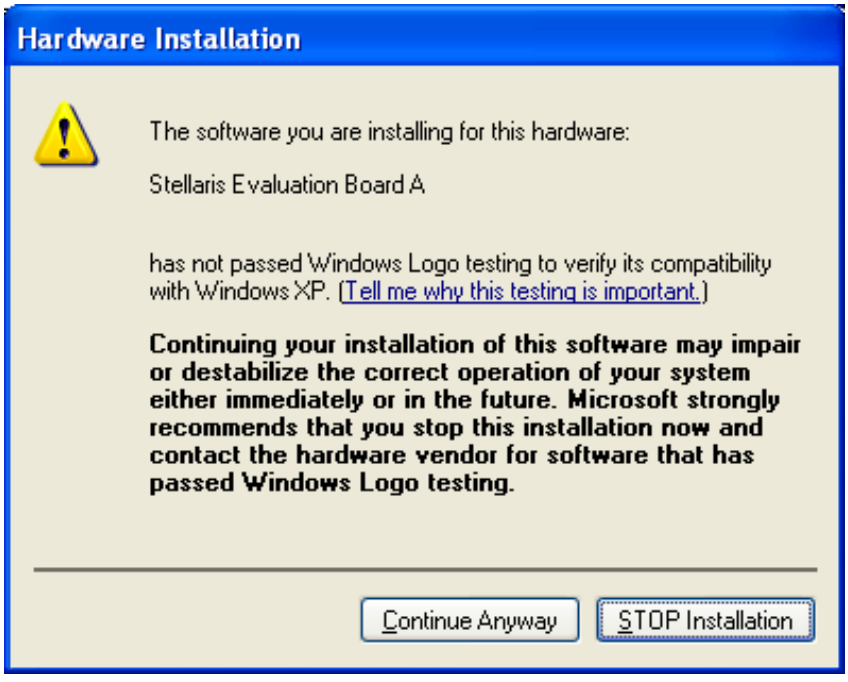
Next, the Found New Hardware Wizard asks from where to install the software. Select "Install from a list or specific location (Advanced)" and click Next.



Make sure the “Documentation and Software” CD that came with the development 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 may pop up during the Hardware Installation like the one below; click Continue Anyway.



Windows finishes installing the drivers for “Stellaris 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 “Stellaris Evaluation Board A.” The USB device built into the board is a composite USB device. After you click Finish, Windows automatically installs a driver for the “Stellaris 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 “Stellaris Virtual COM Port.” Again, follow the same instructions to install the drivers for this device.

Now all of the hardware drivers for the LM3S9B96 Development Board have been installed. These drivers give the debugger access to the JTAG interface and the host PC access to the Virtual COM Port.

With the drivers installed, Windows automatically detects any new Stellaris boards that you attach, and install the drivers for you.

Quickstart Application

The LM3S9B96 Development Board comes pre-programmed 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 Stellaris menu appears that lets you select a variety of interesting applications.

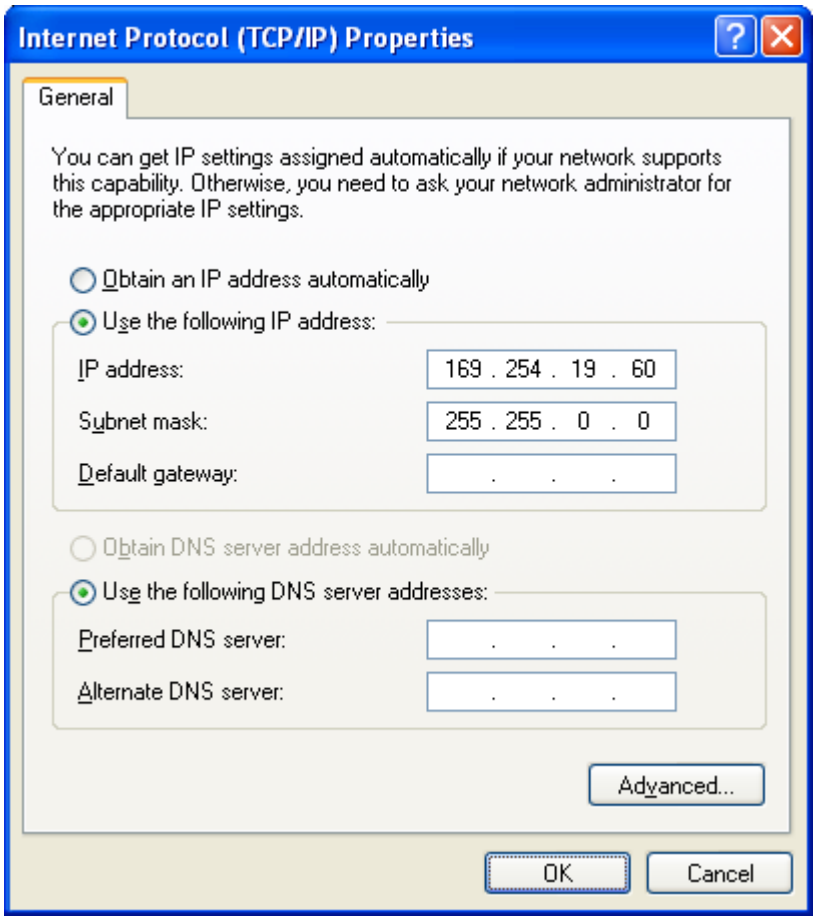
The quickstart application is actually a collection of smaller applications. These include:

- IO Examples
  Ethernet IP address, file system status, board IO status (POT value, mouse pointer location, LED on/off)
- Graphics Demo
  Demonstrates the features of the Stellaris Graphics Library
- Audio Player
  Browse and play WAV files from the included microSD card or USB stick
- Image Viewer
  Browse and view images from the installed file system image (if present)
- Web Server

When the application starts running, you can use the touchscreen to navigate through the different applications. Note that the audio player can play uncompressed, PCM format WAV files from either the microSD card slot or a USB flash stick. When using a USB flash stick, the bit rate for the audio must be less than 64 Kbytes/sec for the audio to play smoothly.

If there is a DHCP server present on the LAN, the board attempts to obtain an IP address from the DHCP server. After about a minute, if no DHCP server is found, the board defaults to an IP address in the range of 169.254.xx.xx using AutoIP. The IP address then displays in the IO Examples sub application. To view the web page you must configure your host machine to be on the same subnet as the board. If connecting to a LAN, your PC's configuration should match the board's configuration, except for the IP address. In most cases, if you connect the board directly to your PC, your machine automatically detects the correct IP address and subnet settings after several seconds.

In some cases, you need to manually configure your IP address and mask subnet. To do this, disable the machine's wireless network connection and any other internet connections that could interfere with the network being created. Select the Internet Protocol (TCP/IP) connection within the Local Area Connection Properties and click Properties. Next, manually configure your IP address as 169.254.xx.yy (that is, use something different than the board) and your subnet mask to 255.255.0.0, as shown below.



Now you can connect your host machine directly to the LM3S9B96 Development Board with the Ethernet cable provided in the development kit. The integrated PHY on the LM3S9B96 has an Auto-MDX feature which allows you to use either a straight-though or cross-over Ethernet cable. To access the board's web page, simply type in the address IO Examples sub application (for example, http://169.254.19.63) into the address bar of your host's web browser and the web page will be loaded from the LM3S9B96 Development Board.

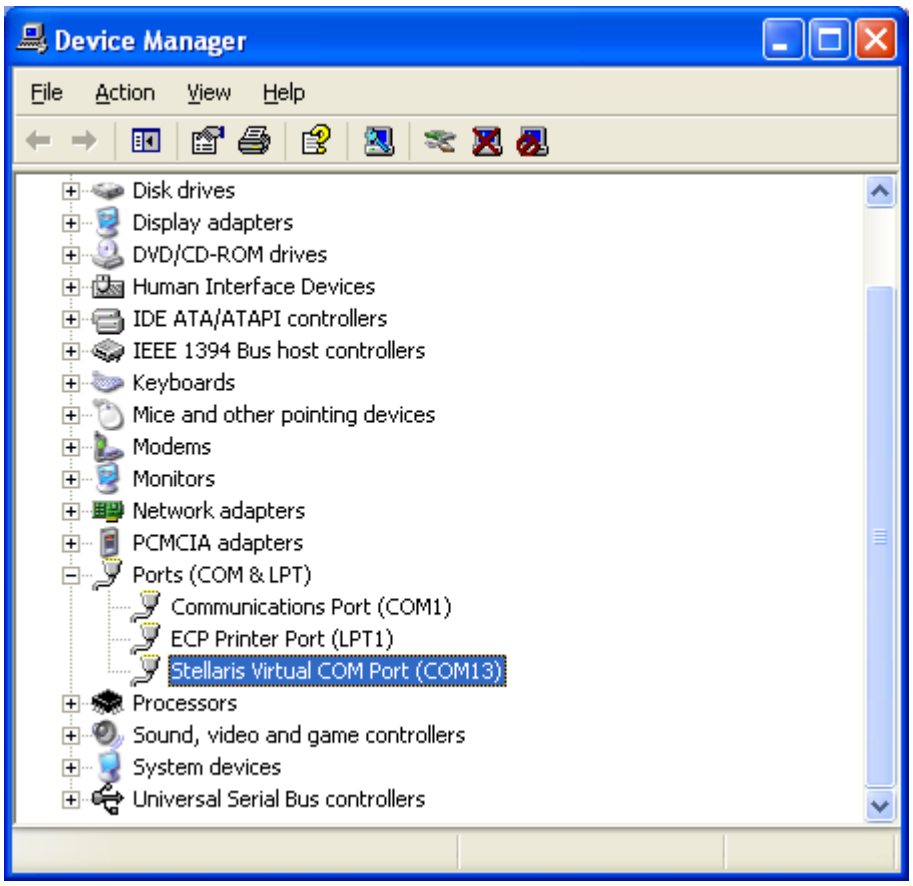
When the web server loads, there are a variety of things that you can view. You can browse the filesystems of the attached devices (microSD card or USB flash stick), as well as launch the Photo Gallery. The DK board is shipped with a suitable file system image for the Image Viewer in the serial flash device. If at any point, you need to replace this image, you can do so using TFTP. Locate the "ramfs_data.bin" file found in StellarisWare/boards/dk-lm3s9b96/qs-checkout, then type the following into the command line to install it over TFTP (assuming you already have TFTP installed):

```
tftp –i <ip_address> PUT ramfs_data.bin eeprom
```

Once the filesystem image is installed, the board must be rebooted for the web server and Image Viewer applications to find it. The board can also receive commands over the UART. If you have connected to the ICDI interface, you will have a Virtual COM Port available to communicate with the board since UART0 of the LM3S9B96 is connected to the FTDI's second serial channel. To view the command line, 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 LM3S9B96 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 the Device Manager button.
4) Click the + symbol to expand the Ports (COM & LPT) group.
5) "Stellaris 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 COM13.



You have the following options when connected to the serial interface:

```
> help

Available commands
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help       : Display list of commands
h          : alias for help
?          : alias for help
addr       : Show ethernet and IP addresses
ls         : Display list of files
chdir      : Change directory
cd <dir>   : alias for chdir
pwd        : Show current working directory
cat <file>: Show contents of a text file
```

LM3S9B96 DEVELOPMENT KIT README FIRST

Software Development Tools

The next step is to install and run the software development tools included in the development kit. For more information, see the quickstart guides included on the Stellaris LM3S9B96 Development Kit CD. Additional tools may be available through the www.ti.com/stellaris web site.

References

The following references are included on the Stellaris LM3S9B96 Development Kit Documentation and Software CD and are also available for download at www.ti.com/stellaris:

- *Stellaris LM3S9B96 Development Kit User's Manual*
- *DK-LM3S9B96 Firmware Development Package User's Guide*
- DK-LM3S9B96 Firmware Development Package
- *StellarisWare® Driver Library User's Manual*
- Stellaris LM3S9B96 Microcontroller Data Sheet

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Rev. 1.3 7/2/2011

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