

Stellaris[®] 2.4 GHz CC2560 *Bluetooth*[®] Wireless Kit

The Stellaris 2.4 GHz CC2560 *Bluetooth*[®] Wireless Kit (DK-EM2-2560B) provides an easy way to evaluate the capabilities of the Texas Instruments' CC2560 *Bluetooth* Transceiver and Bluetopia[®] *Bluetooth* Protocol Stack using the Stellaris DK-LM3S9B96 Development Board or the DK-LM3S9D96 Development Board (each sold separately). For the remainder of this document, all references will be to the DK-LM3S9x96 including references to directories, documents, files, and so on.

Requirements

- You have a Stellaris DK-LM3S9x96 development platform (sold separately)
- You have a Stellaris *Bluetooth* Wireless Kit (DK-EM2-2560B)
- You have a *Bluetooth* wireless technology A2DP source device (for example, a smartphone or wireless mouse)
- You have a headset or speakers (headphones are included in DK-EM2-2560B kit)
- You have the Stellaris DK-LM3S9x96 Development Kit Documentation and Software CD
- You have downloaded the Bluetopia stack and the *Bluetooth* wireless technology examples supplemental installers (if so, skip Prerequisite on page 2)

Kit Contents

The Stellaris *Bluetooth* Wireless Kit includes the following components:

- 1 DK-LM3S9B96-EM2 Expansion Board
- 1 Panasonic PAN1323 ETU *Bluetooth* Module featuring Texas Instruments' CC2560 *Bluetooth* Transceiver
- 1 eZ430-RF2560 *Bluetooth* Evaluation Tool
 - 1 RF256XT target board
 - 1 USB stick in plastic housing
 - 1 battery board
 - 2 AAA batteries
 - 1 pair of earbuds



DK-EM2-2560B *Bluetooth* Wireless Kit

These components provide everything required to demonstrate the two sample applications: Advanced Audio Distribution Profile (A2DP) on page 6 and the Serial Port Profile (SPP) on page 7.

DK-EM2-2560B README FIRST

Prerequisite: Download the Bluetopia Stack and the *Bluetooth* Wireless Technology Examples Supplemental Installers

The Bluetopia stack and *Bluetooth* wireless technology examples supplemental installers require U.S. Government export approval before they can be downloaded. Although this process can be instantaneous, there are cases in which the approval might take several days. If you have not already done so, you should download both installers from the website so that you have the installer packages when you are ready to install and set up your wireless kit. Submit your download request at the www.ti.com/sw-dk-em2-2560b website.

Follow these suggestions to avoid delays:

- Allow at least one to two business days for processing.
- Download instructions are sent via e-mail message once approved. Look for a message from myregistered_software@list.ti.com.
- Provide complete information and fill in all blanks.
- Do not use abbreviations.
- Download the *Bluetooth* wireless technology and Bluetopia supplemental installers only, do not run the supplemental installers until directed to do so in Step 5 on page 5.

Step 1: Set Up the DK-LM3S9x96 Development Board and the EM2 Expansion Board

The EM2 expansion board interfaces to the DK-LM3S9x96 development board via the Extended Peripheral Interface (EPI) connector. To set up the DK-LM3S9x96 development board, do the following:

1. Power down the DK-LM3S9x96 board.
2. Remove any board that is currently fitted to the expansion connector.

Boards that might be installed in this location are the SDRAM expansion board, the EPI Signal breakout board, the Flash and SRAM memory expansion board, or the FPGA expansion board. See Figure 1. DK-LM3S9x96 Development Board on page 3 for reference.

DK-LM392560B README FIRST

- Once the jumpers are in place, fit the EM2 expansion board onto the DK-LM3S9x96 development board. There is a male EPI connector on the bottom side of the EM2 expansion board that connects to the female EPI expansion connector of the DK-LM3S9x96 development board (J2).

Step 2: Connect the PAN1323 Bluetooth Transceiver

Once the EM2 expansion board is connected to the EPI interface, connect the PAN1323 Bluetooth Transceiver to the top (MOD1) pair of connectors on the EM2 expansion board.

The final assembly looks like this. Be sure the two jumpers (J4, jumpers 1 and 2) on the PAN1323 board are installed as shown in the photo.



DK-EM2-2560B README FIRST

Step 3: Install Device Drivers and LM Flash Programmer

The following instructions assume that you have already installed the debug and virtual COM port device drivers for the DK-LM3S9x96 board. If you have not yet installed these drivers, see the *LM3S9x96 Development Kit ReadMe First* (READMEFirst-DK-LM3S9x96.pdf) which you can find on the CD which is included in the DK-LM3S9x96 development kit package.

Additionally, these instructions assume that you have installed the “LM Flash Programmer” tool. The LM Flash Programmer tool is needed in order to download example applications to the DK-LM3S9x96 development board. The LM Flash Programmer tool is included on the DK-LM3S9x96 development board software CD and also on the CD that is included with the DK-EM2-2560B wireless kit. In either case, navigate to the “Tools” menu on one of these CDs and double-click “LMFlashProgrammer.msi” to install the application.

Step 4: Install StellarisWare Software

If you have not done so already, install the StellarisWare software release for the DK-LM3S9x96 development board using the following file on the CD (where xxxx is the software release number):

```
\Tools\StellarisWare\SW-DK-LM3S9x96 -xxxx
```

Note: You can also download the latest version of StellarisWare by going to the www.ti.com/sw-dk-lm3s9b96 website. From this page, you can see the current version of the latest StellarisWare software. Click the Get Software button to download and complete the export approval form when prompted.

Step 5: Run the Bluetopia Stack and *Bluetooth* Wireless Technology Examples Supplemental Installers

After you install the StellarisWare release, you must add *Bluetooth* wireless technology function to the EM2 expansion board by running the Bluetopia stack and *Bluetooth* wireless technology examples supplemental installers that you downloaded previously. Navigate to the directory where you downloaded these two files (from the Prerequisites step on page 2) and double-click each file to launch the installer (xxxx is the release number):

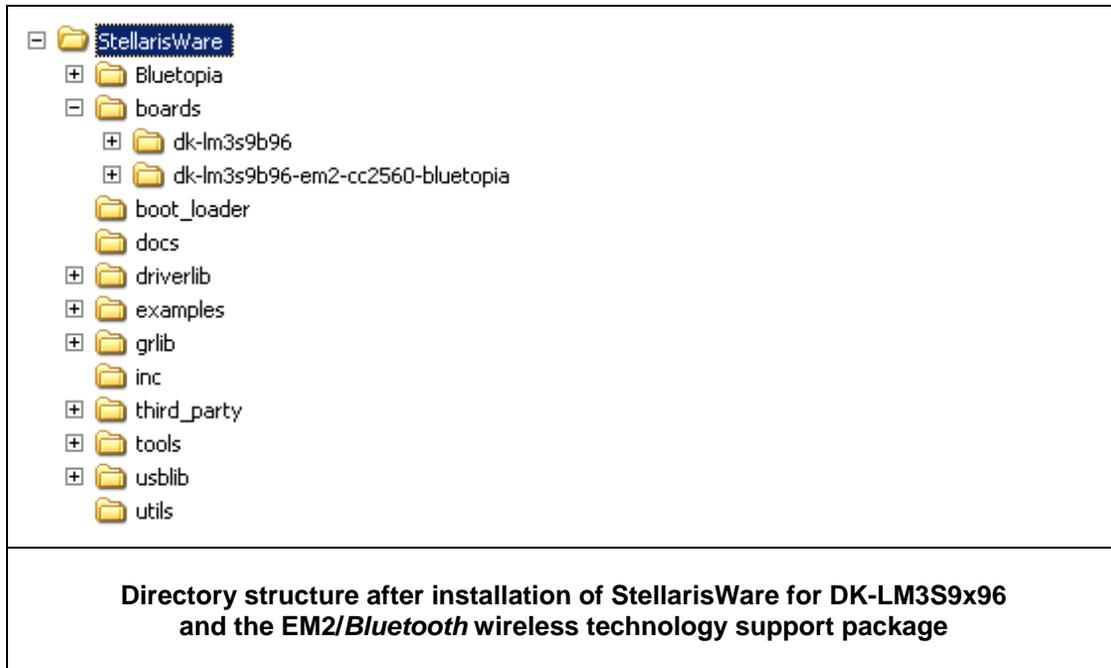
```
SW-DK-LM3S9x96 -EM2-CC2560-BLUETOPIA-xxxx.exe
```

```
SW-BLUETOPIA-STACK-xxxx.exe
```

DK-EM2-2560B README FIRST

Follow the installer prompts and install the *Bluetooth* wireless technology support files in the same directory that you used for the base StellarisWare files in Step 4, to ensure that the added files appear in the correct place in the directory tree. For best results, you should also verify that the version numbers for the base StellarisWare release and supplemental installers are the same.

Once you have completed these steps, the StellarisWare software will be located in the C:\StellarisWare directory (if you selected the default installation path) with subdirectories as shown in the next figure.



Step 6: Attach Headset (or Speakers) for the A2DP Example

Connect the headphone output directly to any standard headphone or connect the line output to an external amplifier, including PC desktop speaker sets.

Step 7: Flash the A2DP Example Application

The A2DP example application sets up the DK-LM3S9x96 development board as an A2DP sink device. Use the LM Flash Programmer tool to flash the “bt_a2dp_safertos.bin” file to the DK-LM3S9x96 development board. If you installed StellarisWare in the default directory, select the binary for the toolchain you want to use by navigating to the corresponding directory under C:\StellarisWare\boards\dk-lm3s9b96-em2-cc2560-bluetopia\bt_a2dp_safertos. The bt_a2dp_safertos directory contains subdirectories for each

DK-EM2-2560B README FIRST

supported toolchain and each of these contains a copy of the executable built with those tools.

When the flash programming completes, reset the DK-LM3S9x96 development board and the application should run. Once the device becomes a Discoverable, the user LED flashes. With the A2DP sink device running, you can now connect an A2DP source device.



Figure 2 - A2DP Example Application Display

Step 8: Connect the A2DP Source Device

Using a *Bluetooth* wireless technology A2DP-capable device, start a search for the DK-LM3S9x96 device. The device appears with the friendly name of “A2DP Demo.” If the source device requests a PIN, enter “0000.”

Start the audio on the A2DP source device. You should hear sound from the speakers or headphones that you connected to the DK-LM3S9x96 development board. You are now finished with the A2DP example application.

Note: The remaining steps are for setting up and running the SPP example.

Step 9: Assemble the eZ430 *Bluetooth* Evaluation Tool for the SPP Example

Assemble the eZ430 *Bluetooth* Evaluation Tool by connecting one of the RF2560T target boards to the battery board as shown in the photo.



DK-EM2-2560B README FIRST

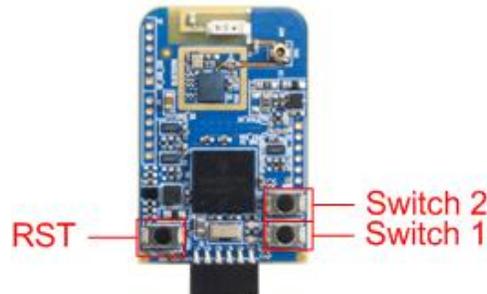
Step 10: Flash the SPP Example Application

The SPP example application sets up communication between devices using Serial Port Protocol (SPP). Use the LM Flash Programmer tool to flash the “bt_spp.bin” file to the DK-LM3S9x96 development board. If you installed StellarisWare in the default directory, select the binary for the toolchain you want to use by navigating to the corresponding directory under C:\StellarisWare\boards\dk-lm3s9b96-em2-cc2560-bluetopia\bt_spp. The bt_spp directory contains subdirectories for each supported toolchain and each of these contains a copy of the executable built with those tools.

When the flash programming completes, you should see the Texas Instruments and Bluetopia logos on the LCD display.

Press the User switch on the DK-LM3S9x96 board. The host device starts searching for the USB stick.

Connect power to the USB stick which is preloaded with the original TI-supplied *Bluetooth* wireless technology sample application. Simply move the jumper to battery, then press the RST button.



Once the display indicates that a device is connected (this may take up to a minute), the eZ430 begins sending accelerometer data, and the DK-LM3S9x96 development board display changes to show a drawing region..

Tilt the eZ430 back and forth to change the accelerometer data. The accelerometer data will be shown by drawing on the display.

Press the Switch 1 button to disconnect communication with the DK-LM3S9x96 development kit.

You are now finished with the SPP example application.

DK-EM2-2560B README FIRST

References

The following references are included on either the Stellaris LM3S9x96 Development Kit Documentation and Software CD or the Stellaris LM3S9B96 EM2 Expansion Board Documentation and Software CD. They are also available for download at the www.ti.com/stellaris or www.ti.com/bluetooth web sites:

- *Stellaris LM3S9x96 Development Kit User's Manual*
- *DK-LM3S9x96 Firmware Development Package User's Guide*
- *DK-LM3S9x96 -EM2-CC2560-BLUETOPIA Firmware Development Package*
- *Stellaris[®] Peripheral Driver Library User's Guide*
- *Stellaris LM3S9x96 Microcontroller Data Sheet*
- *Bluetopia Advanced Audio Distribution Profile (A2DP) Application Programming Interface Reference Manual*
- *Bluetopia Architecture Overview Application Programming Interface Reference Manual*
- *Bluetopia Bluetooth Protocol Stack Application Programming Interface Reference Manual*
- *Bluetopia Bluetooth Protocol Stack Kernel (Non-threaded O/S) Application Programming Interface Reference Manual*
- *Bluetopia Generic Audio/Video Distribution Profile (GAVD) Application Programming Interface Reference Manual*
- *Bluetopia HCI Transport Layer (Non-threaded O/S) Application Programming Interface Reference Manual*
- *Bluetopia Sub-band CODEC (SBC) Application Programming Interface Reference Manual*
- *Bluetopia System Call Requirements (Non-threaded O/S) Application Programming Interface Reference Manual*

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