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CYUSBS236

USB-Serial Development Kit Guide

Doc. # 001-86996 Rev. **

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Safety Information

Regulatory Compliance

The CYUSBS236 USB-Serial kit is intended for use as a development platform for hardware or software in a laboratory environment. The board is an open-system design, which does not include a shielded enclosure. Due to this reason, the board may cause interference to other electrical or electronic devices in close proximity. In a domestic environment, this product may cause radio interference. In such cases, take adequate preventive measures. Also, do not use this board near any medical equipment or RF devices.

Attaching additional wiring to this product or modifying the product operation from the factory default may affect its performance and cause interference with other apparatus in the immediate vicinity. If such interference is detected, suitable mitigating measures must be taken.

The CYUSBS236 kit contains electrostatic discharge (ESD) sensitive devices. Electrostatic charges readily accumulate on the human body and any equipment, and can discharge without detection. Permanent damage may occur on devices subjected to high-energy discharges. Proper ESD precautions are recommended to avoid performance degradation or loss of functionality. Store unused CYUSBS236 boards in the protective shipping package.

End-of-Life/Product Recycling

This kit has an end-of-life cycle after five years from the year of manufacturing mentioned on the back of the box. Contact your nearest recycler for discarding the kit.

General Safety Instructions

ESD Protection

ESD can damage boards and associated components. Cypress recommends that you perform procedures only at an ESD workstation. If an ESD workstation is not available, use appropriate ESD protection by wearing an antistatic wrist strap attached to the chassis ground (any unpainted metal surface) on the board when handling parts.

Handling Boards

CYUSBS236 boards are sensitive to ESD. Hold the board only by its edges. After removing the board from its box, place it on a grounded, static-free surface. Use a conductive foam pad if available. Do not slide the board over any surface.

CAUTION

- Use only 5 V/2 A power-supply adapter provided with the kit
- Use only the recommended rechargeable Li-ion Battery. Check the polarity of the battery connector before connecting to the board.

1. Introduction

Thank you for your interest in the CYUSBS236 USB-Serial Development Kit (DVK). This DVK is designed as an easy-to-use kit, showcasing the unique features of Cypress's CY7C65215 USB-Serial bridge controller. This device includes CapSense®, Cypress's leading capacitive touch-sensing technology, and the Battery Charger Detection (BCD) feature, which is compliant with the USB Implementers Forum (USB-IF) Battery Charging Specification. This kit includes four EEPROMs to demonstrate I2C and SPI, two RS-232 line-drivers for UART, two CapSense touch buttons, and a Lithium ion (Li+) battery charger circuit.

CY7C65215 is the first full-speed USB-Serial bridge controller that offers a dual-channel configurable serial interface (UART/I2C/SPI). The controller also features BCD and capacitive touch sensing at low suspend-state currents of 5 uA. The controller is offered in a 5x5-mm, 32-pin QFN package to meet the dimensional requirements of portable devices.

1.1 Kit Contents

The CYUSBS236 kit contains the following items:

- CYUSBS236 DVK board
- Quick start guide
- USB standard-A to micro-B cable
- Jumper wires
- Extra jumpers
- 5-V power supply adapter
- CY7C65215-32LTXI sample silicon chips

Figure 1-1. Kit Contents

Inspect the contents of the kit; if you find any part missing, contact your nearest Cypress sales office for assistance or go to www.cypress.com/go/support.

1.2 Getting Started

This kit guide helps you get acquainted with the CYUSBS236 DVK. The Software Installation chapter on page 11 provides step-by-step instructions to install the CYUSBS236 DVK software. The Kit Operation chapter on page 15 describes how the kit operates, and explains how to configure the CY7C65215 USB-Serial bridge controller using the Cypress USB-Serial Configuration Utility. The Hardware chapter on page 65 discusses the kit hardware. The Additional Information chapter on page 81 explains how to run the CYUSBS236 kit on the Mac OS. The Appendix on page 83 provides the schematics, layout, bill of materials (BoM), troubleshooting guidelines, and board layout design guidelines for the CY7C65215 USB-Serial bridge controller.

1.3 Additional Learning Resources

Visit the USB-Serial web page, www.cypress.com/go/usbserial for additional learning resources in the form of datasheets and application notes.

1.4 Technical Support

For assistance, go to www.cypress.com/go/support or contact our customer support at +1 (800) 541-4736 Ext. 8 (in the USA) or +1 (408) 943-2600 Ext. 8 (International).

1.5 Document History

Revision	PDF Creation Date	Origin of Change	Description of Change
**	09/24/2013	MVTA	Initial version of kit guide

1.6 Documentation Conventions

Table 1-1. Document Conventions for Guides

Convention	Usage
`Courier New`	Displays file locations, user entered text, and source code: `C:\ ...cd\icc\`
Italics	Displays file names and reference documentation: For example, *CYUSBS236 USB DVK.cysusb*.
[**Bracketed, Bold**]	Displays keyboard commands in procedures: [**Enter**] or [**Ctrl**] [**C**]
File > Open	Represents menu paths: File > Open > New Project
Bold	Displays commands, menu paths, and icon names in procedures: Click the **File** icon and then click **Open**.
Times New Roman	Displays an equation: 2 + 2 = 4
Text in gray boxes	Describes cautions or unique functionality of the product.

1.7 Abbreviations

The following table lists the abbreviations used in this kit guide.

Abbreviation	Meaning
BCD	battery charger detection
CDC	communications device class
CDP	charging downstream port
CPHA	clock phase
CPOL	clock polarity
CTS	clear to send
DCD	data carrier detect
DCP	dedicated charging port
DSR	data set ready
DTR	data terminal ready
DVK	development kit
ESD	electrostatic discharge
I2C	Inter Integrated Circuit
LDO	low drop-out
PC	personal computer
PID	product ID
RI	ring indicator
RTS	request to send
SCB	serial communication block
SDP	standard downstream port
SPI	serial peripheral interface
SSN	slave select n
UART	universal asynchronous receiver transmitter
USB	universal serial bus
VID	vendor ID

2. Software Installation

2.1 CYUSBS236 DVK Software

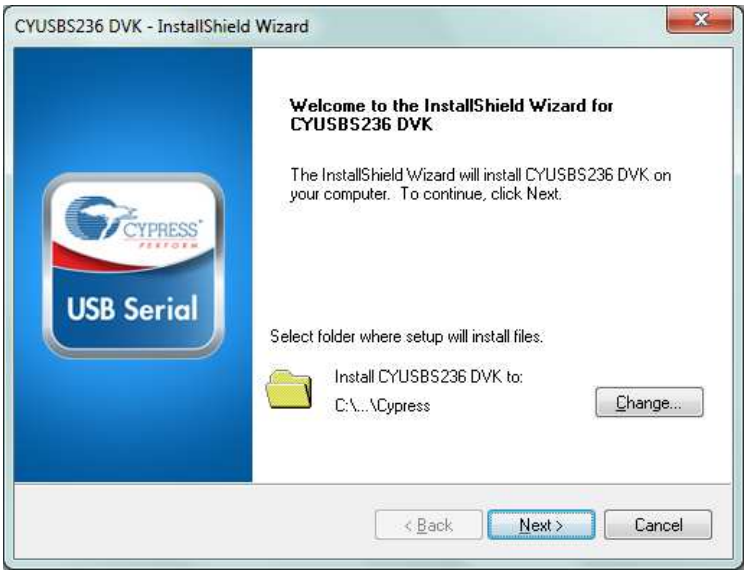
Follow these steps to install the CYUSBS236 DVK software:

1. Download and install the CYUSBS236 DVK software from www.cypress.com/go/CYUSBS236.
   The CYUSBS236 DVK software is available in two different installer formats for download:
   a. **CYUSBS236 Kit ISO:** This file is a complete package, stored in a CD-ROM image format that can be used to create a CD, or extract using ISO extraction programs, such as WinZip or WinRAR. This file includes all the required software, utilities, drivers, hardware files, and user documents.
   b. **CYUSBS236 Kit Setup:** This installation package contains the files related to the kit. It does not include the Windows installer, Microsoft .NET Framework, and Visual C++ redistributable packages. If these packages are not on your computer, the installer automatically downloads and installs them from the Internet.
2. Run ***cyautorun.exe*** to start the installation process.
3. Click **Install CYUSBS236 DVK** to start the installation, as shown in Figure 2-1.

Figure 2-1. Kit Installer Startup Screen

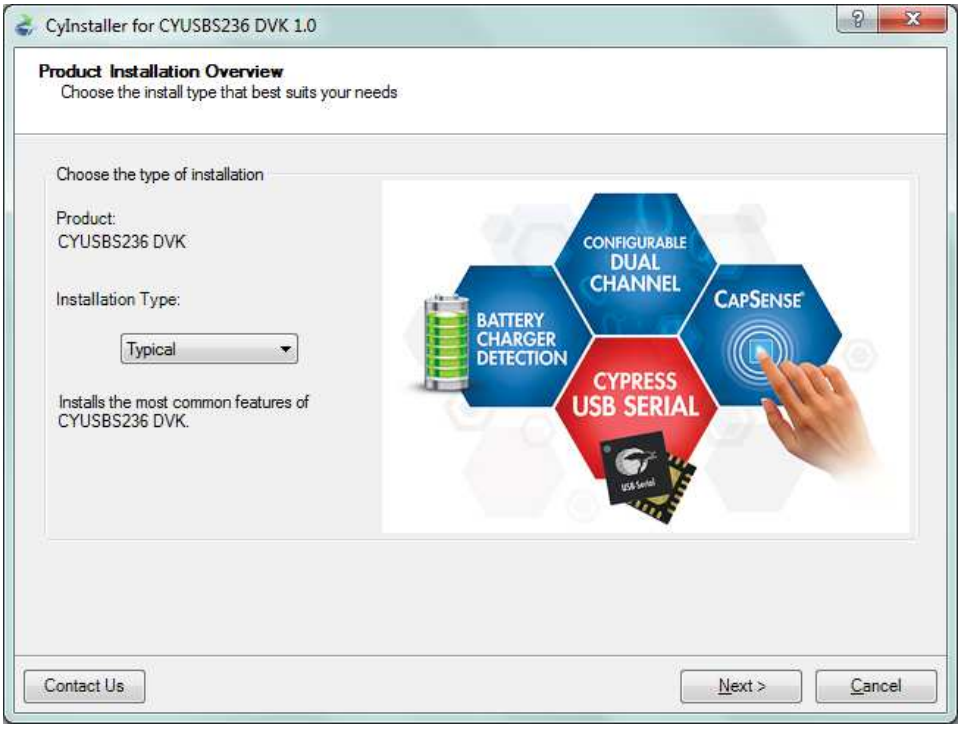
4. Select the folder to install the CYUSBS236 DVK-related files. Choose the directory and click **Next**.

Figure 2-2. Default Path for DVK Installation



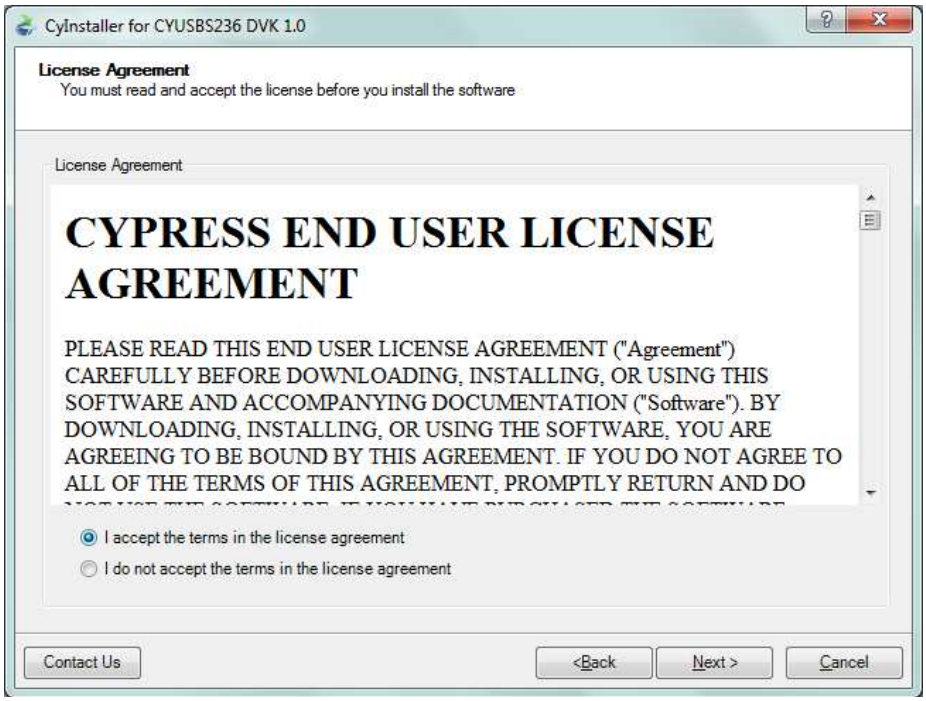
5. The CYUSBS236 Kit ISO installer automatically installs the required software, if it is not present on your computer. The CYUSBS236 Kit Setup installer directs you to download the required software from the Internet.
6. Select the installation type. The drop-down menu has two options: **Typical** (installs all the required features) and **Custom**. Click **Next** after you select the installation type.

Figure 2-3. Installation Type Options



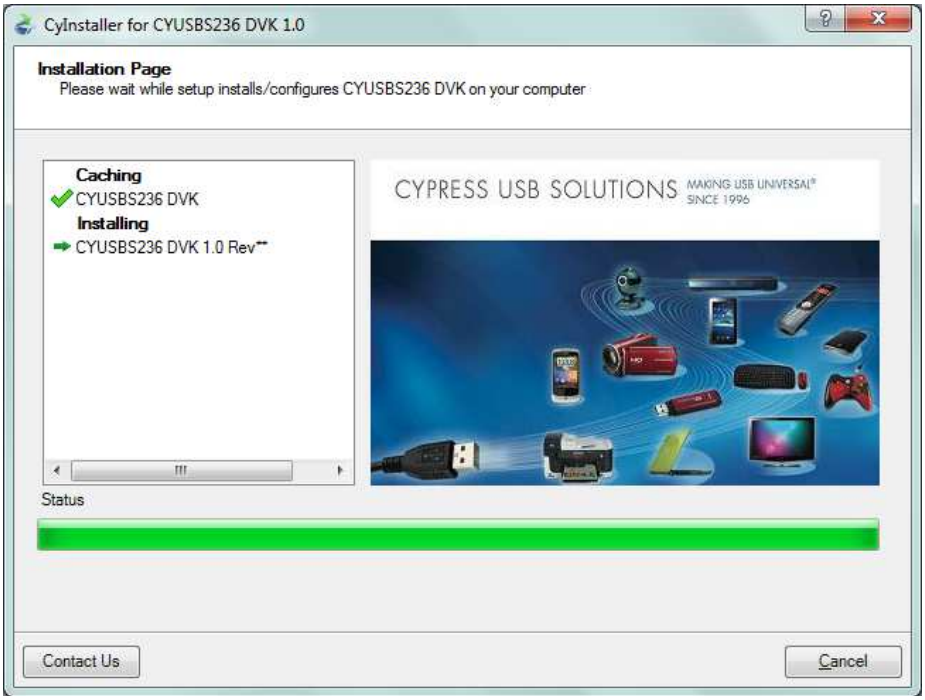
7. Read the Cypress License Agreement and make a selection based on the terms of the license agreement. Click **Next** to continue the installation.

Figure 2-4. Cypress License Agreement



8. When the installation begins, a list of packages appears on the installation page. A green check mark appears adjacent to every package after successful installation. If a message from Windows Security appears, accept the **Always trust software from Cypress Semiconductor** option and click **Install**.

Figure 2-5. Installation Page



9. Enter your contact information or select the **Continue Without Contact Information** check box. Click **Finish** to complete the CYUSBS236 DVK installation.

Figure 2-6. CYUSBS236 DVK Installation Complete

10. After the installation is complete, the kit contents are available at the following location:

```
<Install directory>\Cypress\CYUSBS236 DVK\1.0\
```

2.2 Install Hardware

This kit does not require any additional hardware installation.

2.3 Uninstall Software

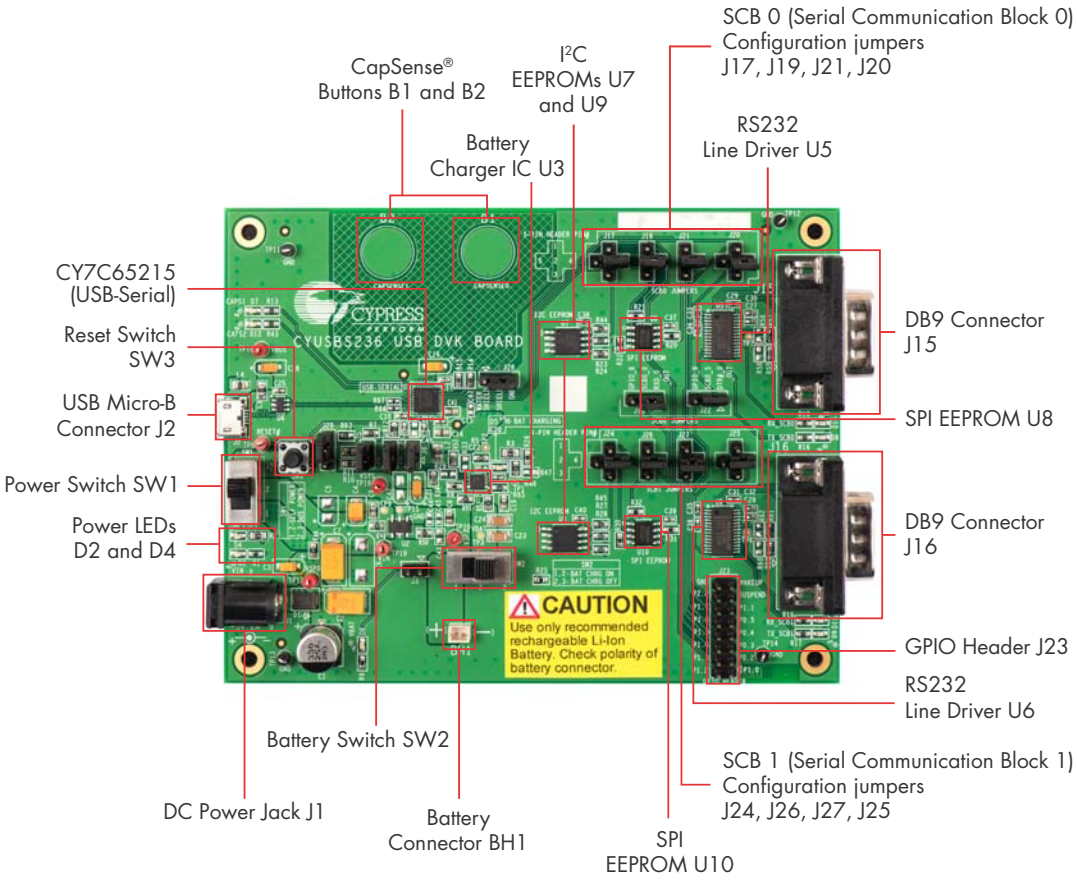
You can uninstall the CYUSBS236 DVK software using one of the following methods:

1. Go to **Start** > **All Programs** > **Cypress** > **Cypress Update Manager**; click the **Uninstall** button.
2. Go to **Start** > **Control Panel** > **Programs and Features**; select the program **CYUSBS236 DVK 1.0 Rev. **** from the list and click the **Uninstall/Change** button.

3. Kit Operation

The CYUSBS236 kit demonstrates the features of the CY7C65215 USB-Serial bridge controller. The CYUSBS236 DVK board is designed to work at 5 V. Figure 3-1 shows an image of the board with references to the onboard components.

Figure 3-1. CYUSBS236 DVK Board



3.1 Default Switch and Jumper Settings

The switches and jumpers on the CYUSBS236 DVK board are shipped with default settings for the USB bus-powered mode, serial interface in the UART mode, CapSense, and BCD enabled. The board is powered by the PC or the hub when it is connected by a USB standard-A to micro-B cable. Table 3-1 provides the default configuration settings for the switches and jumpers.

Figure 3-2. Default Jumper and Switch Settings

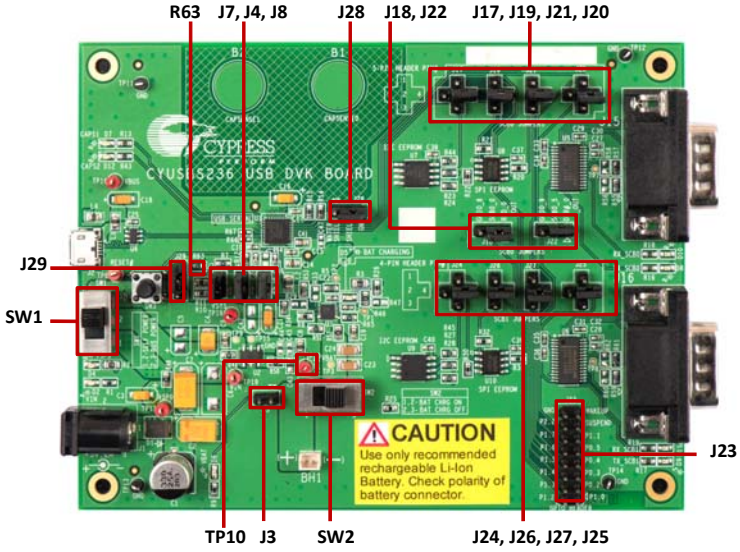


Table 3-1. Default Settings

Jumper	Pins to be Shorted	Function
SW1	Position 2–3	Power supply selection switch set to bus-powered operation
SW2	Position 2–3	Battery power cut-off
J3	Open	VBAT LED
J4	1 and 2	Battery charge enable control pin #0 (BCD0)
J7	1 and 2	Bus detect
J8	1 and 2	Battery charge enable control pin #1 (BCD1)
J17	2 and 4	SCB0 configured as UART
J18	1 and 2	SCB0 configured as UART
J19	2 and 4	SCB0 configured as UART
J20	2 and 4	SCB0 configured as UART
J21	2 and 4	SCB0 configured as UART
J22	1 and 2	SCB0 configured as UART
J23	Open	GPIO header
J24	2 and 4	SCB1 configured as UART
J25	2 and 4	SCB1 configured as UART
J26	2 and 4	SCB1 configured as UART
J27	2 and 4	SCB1 configured as UART
J28	2 and 3	CapSense watershield feature disabled
J29	1 and 2	VBUS detection (The pin near R63 is pin #1 of J29)

3.2 USB-Serial Enumeration

The CYUSBS236 DVK board connects to the PC by a USB standard-A to micro-B cable. The board enumerates as a composite USB device.

Follow these steps for device enumeration:

1. To power up the board:
   a. **Self-powered mode** - Set SW1 to position 1-2 and connect the 5-V power-supply adapter to J1 on the board.
   b. **Bus-powered mode** - Set the switch SW1 to position 2-3.
2. Connect the USB standard-A to micro-B cable to the PC and J2 on the board.
3. The PC detects the board and the software driver is automatically bound to the USB device.

Note If the driver installation is unsuccessful, run *setup.exe* from the following folders with administrative privileges:

`<Install directory>\Cypress\CYUSBS236 DVK\1.0\driver\cyusb3`

`<Install directory>\Cypress\CYUSBS236 DVK\1.0\driver\cyusbserial`

For more information, refer to the Cypress USB-Serial Driver Installation Guide at the following location: `<Install directory>\Cypress\CYUSBS236 DVK\1.0\documentation`

Figure 3-3. Install Location of cyusb3 Driver

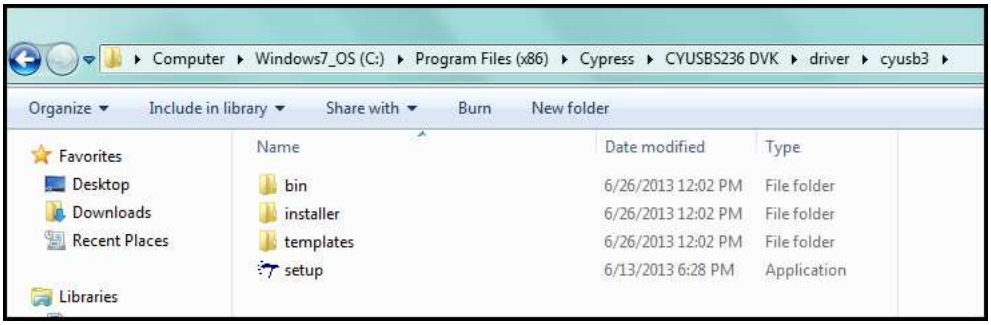
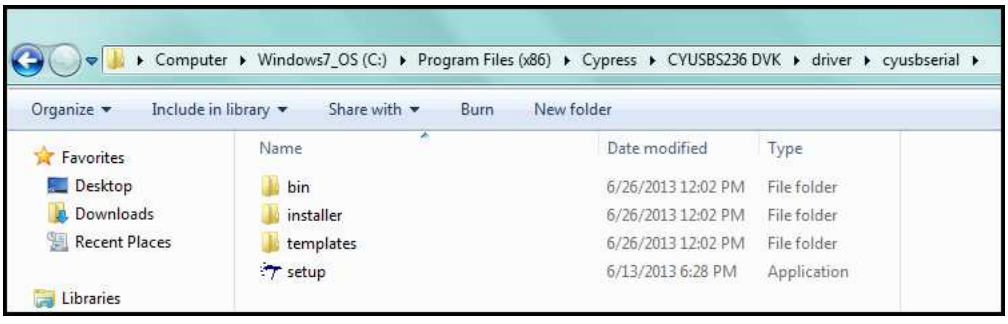


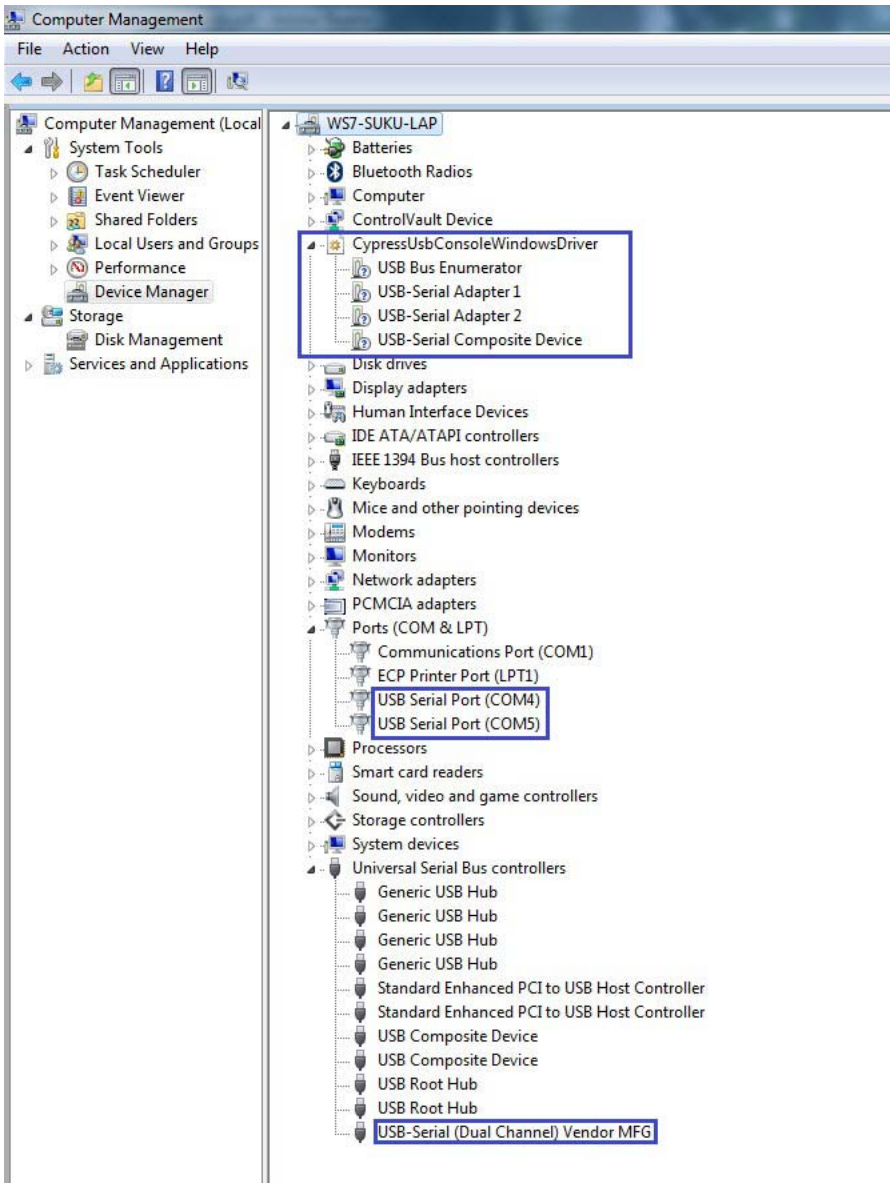
Figure 3-4. Install Location of cyusbserial Driver



Note If a "Welcome to the Found New Hardware Wizard" message appears, select the **Yes, this time only** option and click **Next** to continue the installation.

4. When the software drivers are successfully bound, the board enumeration is complete. The board appears as a composite device in the device manager of the Windows OS (to launch the device manager in Windows 7, go to **Start** > **Control Panel** > **Device Manager**), as shown in Figure 3-5.
   - USB-Serial Adapter under CypressUSBConsoleWindowsDriver
   - USB Serial Port (COM#) under Ports (COM & LPT)
   - USB-Serial (Dual Channel) Vendor MFG under Universal Serial Bus controllers

Figure 3-5. CYUSBS236 DVK Enumeration as Dual UART in Device Manager



3.3 USB-Serial Configuration on Windows OS

The CY7C65215 USB-Serial bridge controller supports two channel configurable UART/I2C/SPI interfaces. Using the Cypress USB-Serial Configuration Utility, you can configure the onboard CY7C65215 USB-Serial bridge controller as a USB-UART bridge, a USB-I2C bridge, or a USB-SPI bridge. You can also use this utility to configure the CY7C65215 device for CapSense and BCD functionality according to your requirements. The following sections provide detailed descriptions about the device features and configurations.

By default, the CYUSBS236 DVK board is configured for the USB-UART bridge, CapSense, and BCD functionality.

3.3.1 Connecting CYUSBS236 DVK to Cypress USB-Serial Configuration Utility

Follow these steps to connect the device using the Cypress USB-Serial Configuration Utility:

1. Connect the USB standard-A to micro-B cable to your PC and the J2 connector on the board.
2. Set switch SW1 to position 2-3 for bus-powered operation.
3. Run the configuration utility from **Start > All Programs > Cypress > CYUSBS236 DVK > USB Serial Configuration Utility**.

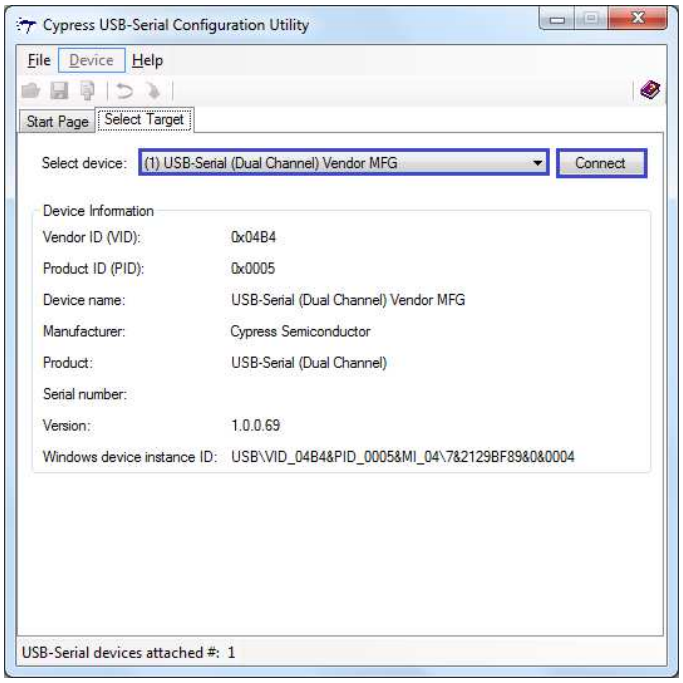
   For a detailed description about the configuration utility, refer to the *USB-Serial Configuration Utility User Guide* at the following location:

   `<Install directory>\Cypress\CYUSBS236 DVK\1.0\documentation`
4. The following figure shows the startup screen of the Cypress USB-Serial Configuration Utility.

Figure 3-6. Configuration Utility Startup Screen

5. Click the **Select Target** tab. Select the device from the drop-down menu and click **Connect**.

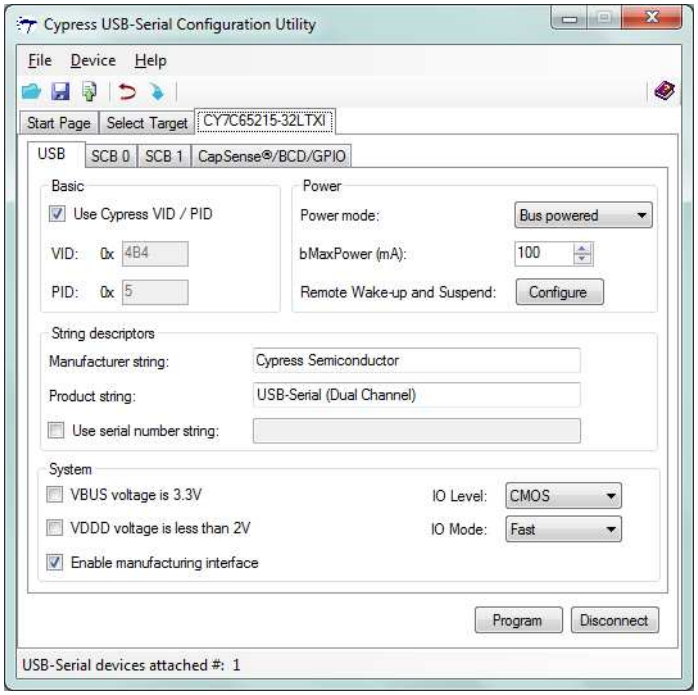
Figure 3-7. Configuration Utility **Select Target** Tab



Note The “version” number shown in Figure 3-7 may vary depending upon the latest firmware version on the USB-Serial bridge controller.

6. A new tab with the connected device's default settings appears, as shown in Figure 3-8. This tab allows you to modify the device configuration settings, which can be programmed into the device.

Figure 3-8. Configuration Utility **USB** Tab

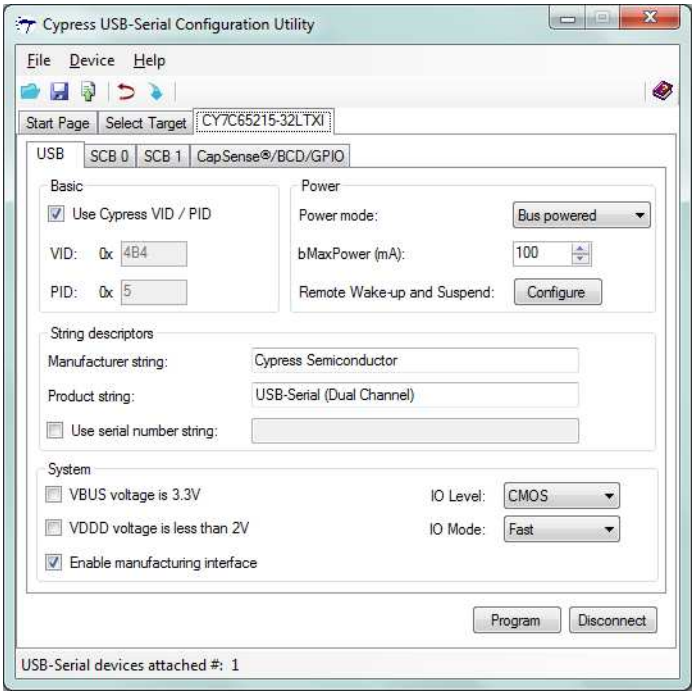


3.3.2 USB Configuration

The USB tab shows the current values of the board's configurable USB and system parameters. Follow these steps to view and modify the parameters for the USB configuration:

1. Follow steps 1 to 6 in the section Connecting CYUSBS236 DVK to Cypress USB-Serial Configuration Utility on page 19 to connect the board to the Cypress USB-Serial Configuration Utility.
2. Click the **USB** tab.

Figure 3-9. Configuration Utility **USB** Tab



3. You can configure the following USB parameters using the Cypress USB-Serial Configuration Utility:
   a. Vendor ID (VID)
   b. Product ID (PID)
   c. Power Mode (bus-powered or self-powered)
   d. bMaxPower
   e. Remote Wake-up and Suspend
   f. Manufacturer string
   g. Product string
   h. Serial number

- **Vendor ID (VID) and Product ID (PID)**

  Default value: 0x04B4 and 0x0005

  A 2-byte vendor ID and product ID must be set in hexadecimal format. The VID and PID options cannot be zero or empty. The Cypress VID/PID is programmed by default. To change this, uncheck the **Use Cypress VID/PID** option. Enter the VID and press the **[Tab]** or **[Enter]** key to enable and enter the PID.

- **Power Mode**

  Default value: Bus powered

  The USB power mode can be set to either self-powered or bus-powered mode.

- **bMaxPower**

  Default Value: 100 mA

  The USB device current requirement value can be set in the range 1 to 500 mA in steps of 2 mA units in bus-powered mode and 0 mA to 500 mA in steps of 2 mA units in self-powered mode.

- **Remote Wake-up and Suspend**

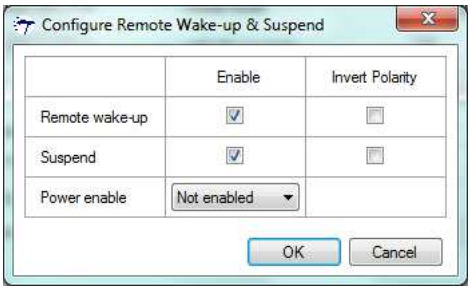
  Default value for Remote wake-up: Enabled

  Default value for Suspend: Enabled

  Default value for Power Enable: Not enabled (for this board)

  Click the **Configure** button (next to **Remote Wake-up and Suspend** in the USB tab) to enable or disable Remote wake-up and Suspend.

  Figure 3-10. Remote Wake-up and Suspend Window



  Configurable options:

  - Remote wake-up: When enabled, this option can be used to wake up the USB host from suspend state remotely from the attached device. By checking the **Invert Polarity** box, polarity of the wake-up pin can be inverted. On this board, J23.15 (GPIO header) is the wake-up pin. To test the Remote wake-up functionality, follow this procedure:

    a. Connect the Remote wake-up pin (J23.15) to GND (J23.16) using the provided jumper wire.

    b. Connect the CYUSBS236 DVK board to a PC using a USB standard A to micro-B cable.

    c. Set the PC into sleep mode. When the PC enters sleep mode, the USB host on the PC side suspends the connected CYUSBS236 DVK board.

    d. By default, the Remote wake-up pin is active high. Disconnect the Remote wake-up pin (J23.15) from GND (J23.16) and touch TP10 (V3P3), as shown in Figure 3-2. If the **Invert Polarity** option is selected, then connect the pin to GND to wake up the USB host from the Suspend state.

  - Suspend: By checking this box, the Suspend option is enabled. When the USB bus enters the Suspend state, the suspend pin is asserted. By checking the **Invert Polarity** box, polarity of the Suspend pin can be inverted. On this board, J23.13 (GPIO header) is the suspend pin.

  - Power enable: The Power enable function is enabled by assigning a GPIO from the drop-down menu. When the USB-UART bridge is configured by the host, this GPIO is asserted. In bus-powered embedded system, to meet the USB 2.0 Specification requirements during Unconfigured and Suspend states, this pin can be used as a notification to control the power to the system. Refer to the *Configuration Utility User Guide* for more details about these options.

Test Procedure for Suspend and Power Enable Pin.

a. Connect the CYUSBS236 DVK board to a PC using a USB standard A to micro-B cable.
b. Set the PC into sleep mode.
c. Check the Suspend pin (J23.13) and Power Enable pin (selected GPIO which comes on external header J23) using a digital multimeter or digital storage oscilloscope. The Suspend pin goes low and Power Enable pin goes high during sleep mode. (By default, the invert polarity is disabled. If the invert polarity is enabled, the Suspend pin goes high during sleep mode.)
d. Wake up the PC using the Remote wake-up feature described in page 22, or using any other device such as a mouse or keyboard connected to the PC. When the PC becomes active, the Suspend pin goes high and power enable pin goes low.

- **Manufacturer string**

  Default value: Cypress Semiconductor

  The Manufacturer string can be a value of up to 32 characters.

- **Product string**

  Default value: USB-Serial (Dual Channel)

  The Product string can be a value of up to 32 characters.

- **Serial number string**

  Default value: NULL (No serial number)

  Select the check box to enter the serial number, which can be a value of up to 32 characters. If you do not require the serial number, deselect the check box.

System

The Configurable options are:

a. VBUS voltage is 3.3 V
b. VDDD voltage is less than 2 V
c. Enable manufacturing interface
d. I/O Level
e. I/O Mode
f. Program button
g. Disconnect button

- **VBUS voltage is 3.3 V**

  Default value: Unchecked

  This option must be checked if the VBUS pin is supplied with 3.3 V, and unchecked if the VBUS pin is supplied with 5 V. The board is designed only for 5-V VBUS operation. This option must always be unchecked for the board. The CY7C65215 device supports VBUS voltage range from 3.15 V to 5.25 V.

- **VDDD voltage is less than 2 V**

  Default value: Unchecked

  The board is designed only for 5-V operation. This option must always be unchecked for the board. The CY7C65215 device supports VDDD voltage range from 1.71 V to 5.5 V.

- **Enable manufacturing interface**

  Default value: Checked

  This option enables an additional vendor class manufacturing mode interface for reprogramming the device. For more information, refer to the Enable Manufacturing Interface section in the *Cypress USB-Serial Configuration Utility User Guide*.

- **I/O level**

  Default value: CMOS

  You can set the device's GPIO logic levels to either CMOS or LVTTL.
- **I/O Mode**

  Default value: Fast

  You can set the device's GPIO edge transitions to either fast or slow for EMI considerations. For more information, refer to the GPIO AC Specifications table in the datasheet.
- **Program button**

  After configuring all the device settings, the updated configuration settings must be programmed to the device. To program the device, click the **Program** button.
- **Disconnect button**

  Click this button to disconnect the DVK from the configuration utility.

4. After configuring the USB and system parameters, click the **Program** button to save the changed USB parameters. On successful programming, the "Program Succeeded" message appears.
4. Click **OK** to continue.
5. Click the **Disconnect** button to disconnect the board from the configuration utility.
6. Press the reset switch **SW3** on the board. The controller is reinitialized with the new parameters and the board re-enumerates, as shown in Figure 3-5 on page 18.

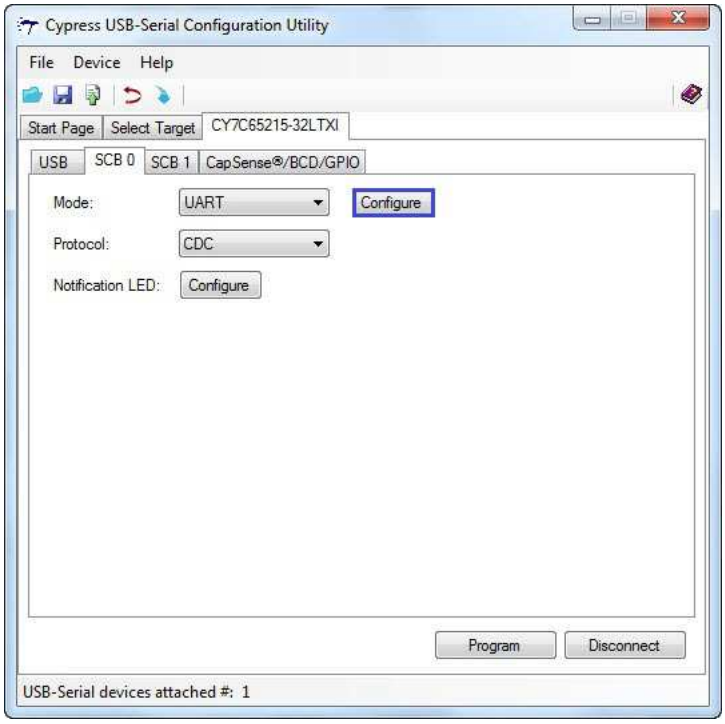
3.3.3 UART Configuration

The CYUSBS236 DVK board is configured for two-channel UART interfaces by default. The board can act as a dual USB-UART bridge to transfer and receive data between the device and the PC via terminal communication software, such as Hyperterminal or Tera Term.

Follow these steps to view and modify the parameters for the UART configuration:

1. Follow steps 1 to 6 of the section Connecting CYUSBS236 DVK to Cypress USB-Serial Configuration Utility on page 19 to connect the board to the Cypress USB-Serial Configuration Utility.
2. Click the **SCB0** tab. Select **UART** as the SCB0 mode from the drop-down menu.

Figure 3-11. Configuration Utility **SCB** Configuration Tab



3. Click the **Configure** button, as shown in Figure 3-11, to configure the UART parameters.

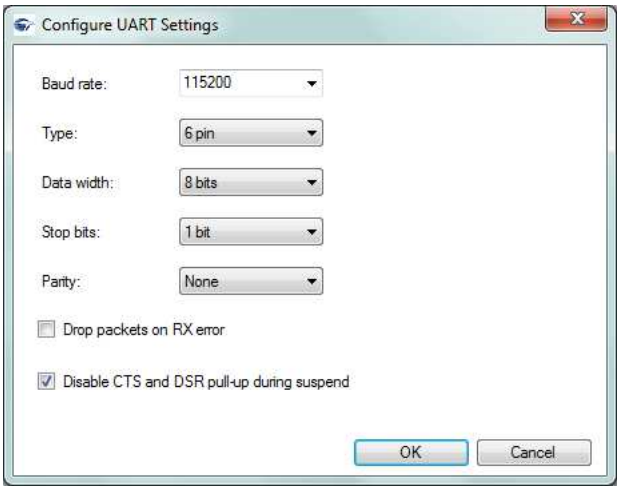



Figure 3-12. **UART** Configuration Parameters