



The following products provided by Cheap Control Systems allow users to modify configuration settings via a TTL serial connection:

- Cheap Twelve Channel Servo Controller (C12C)
- Cheap Scooter Motor Controller (CSMC)
- Cheap Quad Relay Controller (CQRC)

The TTL serial connection is an inexpensive interface that allows CCS products to be configured in the field, using the Cheap LCD (CLCD) or from any Windows-based PC or laptop using the CCS Serial Cable. The Cheap LCD consists of a simple 2-line LCD display and a 4-button user interface. The CCS Serial Cable allows any PC (along with some free software and resources) to provide an identical user interface. This technical note describes how to use the CCS Serial Cable and a collection of free software packages to allow any PC or laptop to be used as a “CCS Serial Terminal” capable of viewing and changing CCS product settings.

## Resources

You'll need the following hardware and software resources to configure CCS products using a PC or laptop:

### Hardware Resources

- CCS Serial Cable
- Windows-based PC or laptop

### Software Resources

- Windows driver installation package
- PuTTY Terminal Application (freeware)
- CCS Serial Terminal session definition file (freeware)

The only item that you need to purchase is the CCS Serial Cable, which can be used to connect the serial port of any CCS product listed above to the USB port of a Windows-based PC or laptop. The CCS Serial Cable plugs directly into the USB port of your PC and a serial cable that plugs into any CCS serial port. If you need to span a longer distance, a common USB extension cable can be used to connect the CCS Serial Cable to the USB port.

The CCS Serial Cable hardware and driver software is supported by Silicon Laboratories, Inc. (<http://www.silabs.com/>) and the PuTTY software is supported by Simon Tatham (<http://www.chiark.greenend.org.uk/~sgtatham/putty/>). The CCS Serial Terminal session definition file is provided by Cheap Control Systems and is freely distributable to anyone who wants to use it.

## Software Installation

The following installation steps should be taken before connecting the CCS Serial Cable to either the PC or the CCS product:

1. Install the Windows driver for the CCS Serial Cable
2. Install the PuTTY terminal application (optional)
3. Import the CCS Serial Terminal session definition for PuTTY (optional)
4. Create a desktop shortcut for the CCS Serial Terminal (optional)

We now discuss each of these installation steps in detail.

### Install CCS Serial Cable Driver

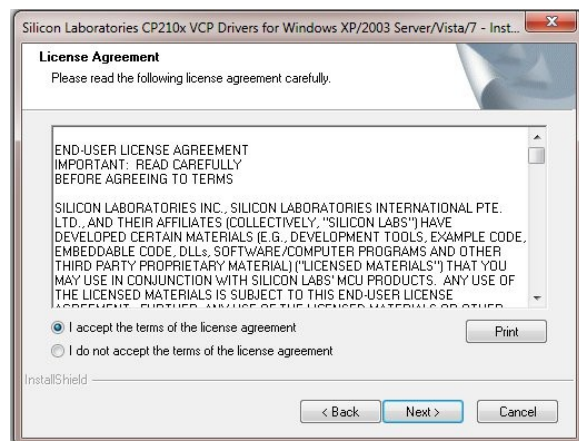
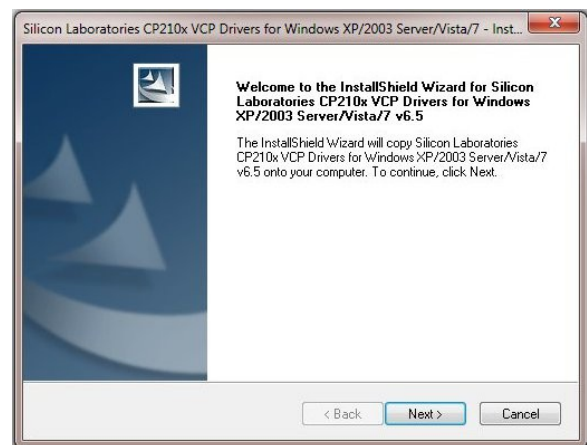
The CCS Serial Cable is based on a USB-to-TTL-Serial circuit made by Silicon Labs (<http://www.silabs.com/>) that allows a PC USB port to communicate with a micro-controller TTL serial port such as that used on CCS products. Silicon Labs provides drivers for various operating systems, including all versions of Windows. The driver installer for the CCS Serial Cable can be downloaded from:

<http://www.CheapControlSystems.com/CCS-Serial-Cable-Resources.zip>

The driver and installation package should work on Windows XP, Windows 2003, Vista and Windows 7 platforms. Before plugging the CCS Serial Cable into your PC, you should perform the following installation procedure.

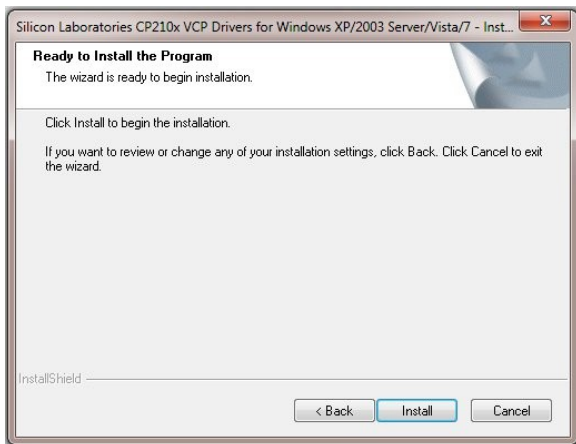
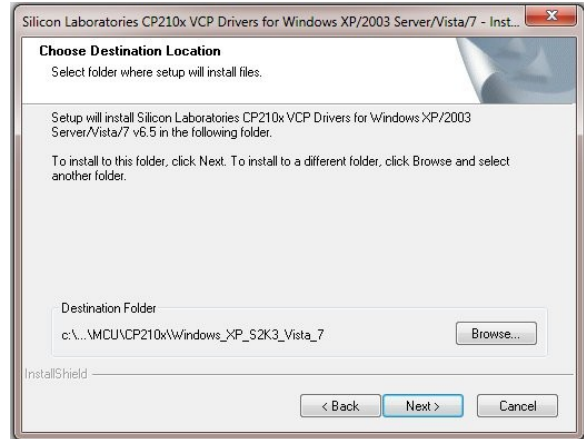
Execute the “CP210x\_VCP\_Win\_XP\_S2K3\_Vista\_7.exe” installer to start the installation process. The installer first copies all driver files to an installation directory on your system, then it installs the driver so that the system will use it whenever the CCS Serial Cable is plugged into a USB port.

The installer starts with a welcome dialog. Press the “Next” button to proceed.



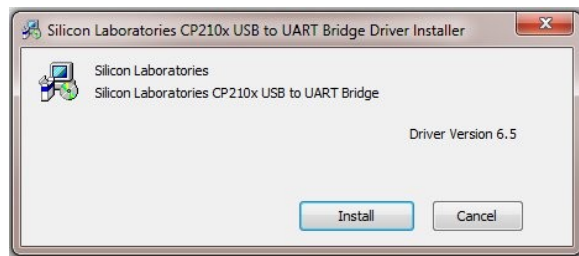
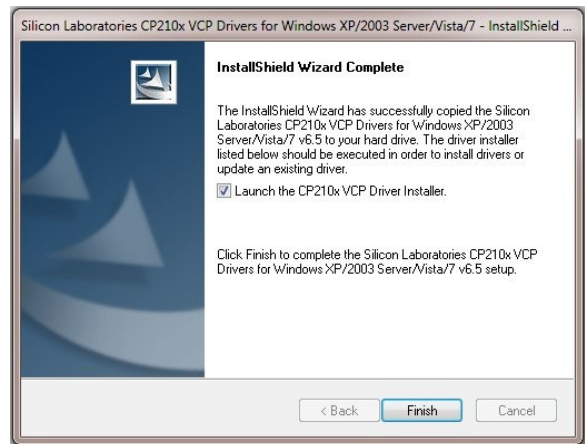
The Silicon Labs License Agreement will be displayed. Select “I accept the terms of the license agreement” and press the “Next” button to proceed.

The destination dialog allows you to specify where the driver files should be copied. The default location is almost always the best location, but you are free to select any folder on your system that is more appropriate. Press the “Next” button to proceed.



The ready dialog gives you one last chance to cancel the installation process or go back and modify your inputs. If everything is entered as desired, press the “Install” button to copy the driver files onto your system.

After the driver files have been copied, the final dialog will be displayed indicating that the driver is ready to be installed. Ensure that the “Launch the CP210x VCP Driver Installer” option is checked, the press “Finish” to start the driver installation process.



The driver installer will display a dialog showing the current driver version. Press the “Install” button to complete the installation. Upon completion, the driver installer will display a success message indicating that the driver has been installed.



**Depending on the specific Windows platform being used, you may or may not have to reboot the system so that the system will recognize the proper driver when the serial cable is plugged into a USB port.**

### Using the CCS Serial Cable for the First Time

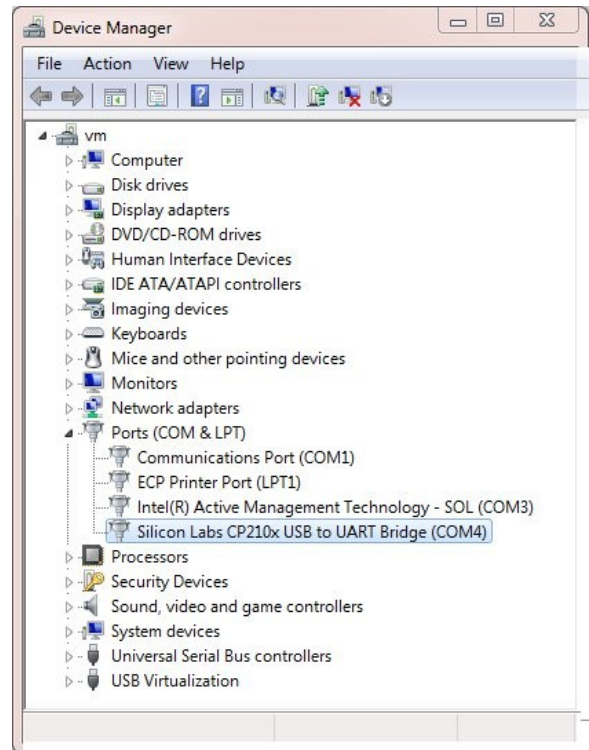
After the driver has been installed the system will automatically detect the CCS Serial Cable when it is plugged into any USB port. The first time you connect the CCS Serial Cable, the system will associate it with the installed driver and will automatically add it to the list of COM ports supported by the system. The specific COM number assigned to the CCS Serial Cable depends on how many other serial devices are supported by the system. To determine the actual COM port assigned to the CCS Serial cable, you need to look it up in the standard Device Manager provided by Windows. Procedures for Windows 7 and Windows XP are provided here:

#### Finding COM Port on Windows 7

1. Select “Control Panel” from the Start Menu
2. Select “System” to display the “System Properties”
3. Select “Device Manager” in the upper left corner
4. Open the “Ports (COM & LPT)” folder
5. Find the entry starting with “Silicon Labs CP210x” and note the assigned COM port indicated at the end of that entry

#### Finding COM Port on Windows XP

1. Select “Control Panel” from the Start Menu
2. Double-click “System” to display System Properties
3. Select the “Hardware” tab, then press the “Device Manager” button
4. Open the “Ports (COM & LPT)” folder
5. Find the entry starting with “Silicon Labs CP210x” and note the assigned COM port indicated at the end of that entry



### Install PuTTY Terminal Application

The CCS Serial Cable provides serial access to a connected CCS product. Any PC application capable of working with a serial device, such as a terminal emulator, can be used to communicate with the CCS product using the serial cable. The freeware PuTTY application is one such application that provides all the essential capabilities and also allows session settings to be stored for repeated usage. The PuTTY application can be downloaded from either of the following locations:

<http://www.CheapControlSystems.com/CCS-Serial-Cable-Resource.zip>

or

<http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html>

The executable file is self-contained and can be installed in any folder on your system, including the Desktop. Simply choose an appropriate folder and copy the executable file to that location. Double-click the executable file to launch PuTTY or create a standard desktop short-cut to launch the executable by double-clicking a desktop icon.

### Import CCS Serial Terminal Session Definition

The CCS Serial Terminal is a customized PuTTY session definition file that defines a 16x2 character display that mimics the display provided by the CLCD. After importing the session file, the terminal can be launched using PuTTY simply by double-clicking an entry in the session list. The CCS Serial Terminal session definition file is distributed as a standard Windows Registry file that can be downloaded from the following location:

<http://www.CheapControlSystems.com/CCS-Serial-Cable-Resources.zip>

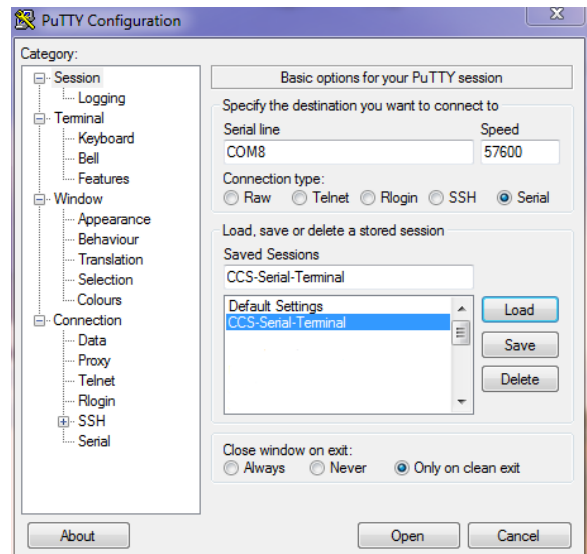
The session definition file can be installed on any Windows system using the following procedure:

1. Copy the CCS-Serial-Terminal.reg file to a temporary location on your system.
2. Right-click the file in the Windows Explorer and select “Merge” from the pop-up menu. On Vista and Windows 7 systems, you'll need to have Administrator privileges to import the file.
3. After the registry file has been imported, you no longer need the registry file

After the registry file has been imported, a “CCS Serial Terminal” session will appear in the PuTTY Configuration window the next time PuTTY is launched, as shown here. Select the “CCS-Serial-Terminal” entry and press “Load” to load the session properties. By default, “COM8” will be set as the serial line and 57600 as the baud rate.

**You should change the serial line entry to be the COM port assigned to the CCS Serial Cable on your system (see previous section for more details).** After changing the COM port, press the “Save” button so that the proper COM port will be used as the default in all future sessions.

Finally, press the “Open” button to start the CCS Serial Terminal session and connect to the CCS product being monitored and/or configured.



**You really only have to press the “Load” and “Open” buttons in PuTTY if you need to examine or alter some of the session settings. If the last settings saved are correct, then you can simply double-click the “CCS-Serial-Terminal” entry to begin the session.**

### **Create a Desktop Shortcut for CCS Serial Terminal**

One of the many useful features of PuTTY is that you can launch it from a Windows desktop shortcut that automatically starts a given session. This provides a quick and easy mechanism for connecting to a CCS product simply by double-clicking a desktop icon. The following procedure can be used to create desktop shortcut that launches the CCS-Serial-Terminal session imported in the previous section:

1. Right-click on the Windows desktop and select “New >> Shortcut” from the menu
2. Browse to the folder where PuTTY was installed and select the “putty.exe” file
3. Enter “CCS Serial Terminal” as the shortcut name and create the shortcut
4. After the shortcut has been created, right-click the shortcut and select “Properties” from the menu
5. Modify the target to include the following arguments:

**“c:\path\to\folder\putty.exe” -load “CCS-Serial-Terminal”**

6. Press “OK” to save the changes

At that point, you can double-click the shortcut icon at any time to launch PuTTY using the CCS Serial Terminal session.

## Normal Operating Procedure

The CCS Serial Cable is the only piece of hardware needed to connect a CCS product to a PC or laptop.



**Although the CCS Serial Cable plugs into a USB port, it may *\*not\** be used to power the CCS product to which it is attached. That is, the CCS product should be powered directly from an appropriate battery or power supply.**

### Connecting to a CCS Product

The following steps should be taken when connecting a CCS product to a PC using the serial cable:

1. With the CCS product powered off, connect the 4-pin connector of the CCS Serial Cable to the “SERIAL” pin header of the CCS product. The exact color combination for the serial cable may vary, but there will always be either a “RED” or “ORANGE” wire on one end of the serial cable connector. In all cases, the “RED” (or “ORANGE”) wire on the 4-pin connector should be connected to the “5V” pin on the “SERIAL” pin header.
2. Power up the CCS product
3. Insert the USB connector of the CCS Serial Cable into an available USB port on the PC (or into a USB extension cord connected to the PC). At that point, Windows should indicate that a new USB device has been found.
4. Launch the CCS Serial Terminal (or equivalent application) to connect to the COM port assigned to the CCS Serial Cable.



**You should always connect the serial cable to the CCS product and power up the CCS product *\*before\** plugging the cable into the USB port. Otherwise, the CCS serial port may not be able to synchronize properly with the USB serial port provided by the serial cable.**

### Using the CCS Serial Terminal

The CCS Serial Terminal defines a 16x2 display in PuTTY that mimics the same functionality provided by the portable Cheap LCD (CLCD). Unlike the CLCD, however, no initial banner is displayed when the CCS Serial Terminal is first connected to the CCS product via the serial cable. Rather, a blank screen will be displayed. Press the “Enter” key to signal the CCS product to start serial communications. At that point, the CCS product will display a banner, indicating that it is ready to accept input from the CCS Serial Terminal.

The CCS Serial Terminal uses the following keyboard keys to provide CCS inputs:

Keyboard Key	CCS Function
Enter	NEXT
Backspace	PREV
Plus Sign (+)	INCR
Minus Sign (-)	DECR

In addition to those standard functions provided by the CLCD, the Escape key can also be used with most CCS products to cause the product banner to be displayed again and move you to the top of the main menu.

## Disconnecting from a CCS Product

After you have finished monitoring and/or configuring the CCS product, you should disconnect everything in the following order:

1. Close the communication session in the terminal software. When using the CCS Serial Terminal session in PuTTY, you can simply close the terminal window to close the session.
2. Power off the CCS product
3. Disconnect the serial cable from the USB port on the PC
4. Disconnect the serial cable from the CCS product

## Software Removal

The following procedures, for Windows 7 and Windows XP, can be used to uninstall and remove all software installed in previous sections. The procedures for Windows 2003 and Vista would be similar.

### Software Removal on Windows 7

1. Select “**Control Panel**” from the Start Menu
2. Select “**Program and Features**” to display the list of installed programs
3. Right-click “**Silicon Laboratories CP210x USB to UART Bridge (Driver Removal)**” in the list and select “**Uninstall/Change**” from the pop up menu to remove the driver
4. Right-click “**Silicon Laboratories CP210x VCP Drivers for Windows XP/2003 Server/Vista/7**” in the list and select “**Uninstall**” from the pop up menu to remove the driver files from the system
5. Locate the folder where “**putty.exe**” was installed and delete the executable file

### Software Removal on Windows XP

1. Select “**Control Panel**” from the Start Menu
2. Double-click “**Add or Remove Programs**”
3. Select the “**Silicon Laboratories CP210x USB to UART Bridge (Driver Removal)**” entry in the list and press the “**Change/Remove**” button to remove the driver
4. Select the “**Silicon Laboratories CP210x VCP Drivers for Windows XP/2003 Server/Vista/7**” entry in the list and press the “**Remove**” button to remove the driver files from the system
5. Locate the folder where “**putty.exe**” was installed and delete the executable file