Lesson 6: An Introduction to the CY4541 CCG4 Kit

Hello. My name is Alan Hawse. In the previous videos, I showed you how to use the CY4531 CCG3 kit. In this video I will demonstrate some of the features of the CY4541 CCG4 kit. This kit is similar to the CCG3 kit, but the CCG4 device integrates two Type-C ports into the same chip. This kit shows you how to build a system with two Type-C ports using a single CCG4 controller. This is extremely useful for products such as notebook computers, docking stations, or hubs which require more than one Type-C port.

The CY4541 kit has two base boards which contain the various connectors for Type-C, Type-B, Display Port, and power. These base boards connect to a daughter board that contains the CCG4 device. The single CCG4 device controls the two separate Type-C port paths independently.

For the first demonstration, I'll connect the power input terminals of the two base boards together. This will allow me to supply power to both base boards and the daughter board from a single power connection. I'll also make sure J5 on the daughter board is set to pins 1 and 2 to select the 3.3V operation, and I'll verify that J11 is installed onto the base boards so that we get a flashing LED when the CCG4 device is operating.

Now I'll connect USB cables from the PC to the USB Type-B ports on the kit.

Next, I'll connect a 24V power adapter to one of the base boards. This emulates the PC's power supply.

Remember that in a real product such as a notebook PC all of this would be integrated. That is, the circuitry from the kit would only be contained inside of the PC and only the two Type-C connectors and possibly one or the other Display Port connector would be exposed.

Finally, I'll connect a USB flash drive to each of the Type-C ports. Notice that they both enumerate on the PC demonstrating simultaneous operation of two Type-C ports through the same CCG4.

For the second demonstration, I will configure the kit such that the setup will operate on power received from a power adapter connected to one of the Type-C ports while the other port is still providing power to the flash drive. In other words, one port will be a power consumer while the other port will be a power provider. This emulates a "dead battery" condition on a notebook PC in which a Type-C power adapter can be used to power the PC even if the battery is completely discharged.

First, I'll remove the 24V adapter and I'll change the board configuration such that the power output header of each base board connects to the power input header of the other base board. In a real Type-C design, this re-wiring would not be necessary because the power switch, the battery charging circuit, and the power management IC would already be included on the base board. Since the kit does not have access to the internal power management circuitry of our PC, I have to manually re-wire this for this demonstration to work.

In this configuration we will NOT connect the 24V power adapter to the kit.

I will remove one of the flash drives and then connect a Type-C power adapter instead. The kit and the flash drive are now powered from the power adapter and the USB flash drive enumerates. If I measure the voltage on the power output header, I'll see a value of around 14.8V, which is the maximum voltage that the power adapter supports. This shows that a power contract was established between the power adapter and the CCG4 device.

Next, I'll swap the flash drive and the power adapter connections demonstrating the ability of Type-C ports to dynamically switch roles from power provider to power consumer. Again, the kit as well as the flash drive are powered and the flash drive enumerates on the PC.

For the final demonstration, I'm going to connect a monitor to one of the Type-C ports and a flash drive to the other. For this, I'll go back to the wiring from the first demonstration. I'll connect the PC's display port output to the kit and then connect a monitor to one of the Type-C ports.

Since this kit has two independent Type-C ports, we could even connect two monitors – one to each port - by using a display splitter. If you are interested, that exact configuration is shown in the CY4541 kit user's guide.

Alright, that's a short demonstration of some of the capabilities of the CY4541 CCG4 kit. In this series of videos I showed you the programmable flexibility of Cypress's Type-C product line. We have the best chips, the best certifications, the best quality, and the best flexibility. I hope that it works well for your products, and as always, you are welcome to email me at alan_hawse@cypress.com or tweet me @askiotexpert, with your comments, suggestions, criticisms, and questions. Thank you very much. I hope you have enjoyed the video series.