

PSoC Creator 101: PSoC 4200 Low Power Modes – Tips and Tricks

Hello. I'm Alan Hawse; Executive Vice President of Software at Cypress Semiconductor.

In the previous lesson, I introduced the power modes of PSoC; Active, Sleep, Deep-Sleep, Hibernate and Stop. I also described the process for entering and exiting those modes.

In this lesson I will teach you some techniques to improve your usage of power and I will describe how to use the PSoC 4 Pioneer Kit to measure your power.

There are times when the PSoC cannot be put into a lower power mode. Because the CPU, where certain peripherals are always required to be active. Creator provides many generated API's with every component that can be utilized to improve your power consumption. The easiest way to reduce power in active mode is to turn off un-used components. Any PSoC Creator component that can be disabled has an underscore Stop API that will halt operation and set the component into its lowest power state. Make sure to check the component's current status before calling the stop API so that critical functions are not interrupted mid transaction. Re-starting a component is as easy as calling the underscore Start API.

Before transitioning to a lower power mode that will not retain a component's configuration, make sure to call the component's underscore Sleep API. This will save all necessary settings for when the part returns to active and the component's underscore Wakeup API is called. Saving settings before sleep will save time when returning to active mode, which will also lower the overall power consumption of the PSoC.

The power burned in a component is proportional to the clock rate of the component. Reducing the operating frequency of the PSoC components can greatly reduce the current consumption. This technique can be applied to the cortex M0, the SAR ADC, digital components, and other devices in the PSoC. You can configure the clocks in the design wide resources tab.

The watchdog timer can operate in Active, Sleep and Deep Sleep modes. Increasing the watchdog timer interval or disabling it entirely before entering low power modes can reduce the time spent in Active mode and reduce the overall power consumption. Remember that the watchdog timer is not active in the Hibernate or the Stop modes.

The PSoC 4 Pioneer development kit was designed to enable your low power development. The PSoC 4's voltage supply is isolated from the other components on the printed circuit board using J13. You can remove the J13 to measure the PSoC current using a digital multimeter. Jumper J9 allows you to switch the VDD between 3.3 volts and 5 volts. Lower power supply voltage will result in lower overall power consumption. In addition, the PSoC 4 can be run at 1.8 volts for the lowest possible power consumption. This can be achieved by removing the J9 jumper and applying 1.8 volts to the center pin. Please refer to the PSoC 4 TRM for more information about 1.8 volt operation.

In summary, to save power turn off the unneeded components, lower the clock frequency of the PSoC and the components, and use the watchdog timer judiciously. I love to help people with PSoC Creator; I'm always interested in hearing from real engineers. Please send me an email and I'll help you work out whatever needs to be worked out so that you can be successful with PSoC.