

# Dac124.c Report

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## Usage

The DAC124.c file is a module used by fetch\_dac.c to control the external 4 channel dac with SPI. The goal was to make minimal alterations to fetch\_dac.c and make the operation of the external dac invisible to the end user. DAC124 is hard coded to use SPI3 and cannot be used when the SDIO card is in use as they share the same pins. The dac124.c code has three functions:

- dac124\_config\_cmd
- dac124\_write\_cmd
- dac124\_reset\_cmd

The dac124 chip requires a 16 bit input with the clock polarity (CPOL) set to zero, the clock phase (CPHA) set to one, and the byte order to be MSB first. The first two bits on the input are the address of the channel to output, the next two bits are the output type (set to 01 to update the dac124 register and write the output), and the last 12 bits are the data to output.

The end user can configure the DAC in fetch\_dac.c by choosing a device (1 -5) with 1 being the STM32F4 onboard DAC and 2-5 using the external. Due to the configuration of the external DAC, selecting device 2-5 will configure all channels on the external DAC by calling the dac124\_config\_cmd in dac124.c. This function sets up the SPI3 driver and sets the CPOL bit to 0, the CPHA bit to 1, and the DFF (Used to set the data frame to 16 bits instead of 8 bits) bit to 1 in the CR1 register. It also sets up SS on GPIOH\_PIN3.

The dac124\_write\_cmd function is also called from the fetch\_dac.c module. It passes in the channel to use, the output type, and the data to transfer. The channel and output type are bit shifted then or'd with the data into a transmission variable then written to the chip.

The dac124\_reset\_cmd does not require any parameters. Its only purpose is to power down all outputs from the external dac.

## Updates for Future Revisions

If the dac124 chip has been configured and outputs have been written it will not reset if the marionette board is reset via software or the reset button. As it is powered by  $V_{CC}$ , the registers on the dac124 will continue to output until it is reset or the board is removed from its power source. A possible fix to this would be to use a GPIO pin as the 3.3V power source so that when the board is reset and all pins are set to input floating the dac chip powers down.