

THE MCP4725 DIGITAL-TO-ANALOG CONVERTER

This book uses the MCP4725 DAC to demonstrate programming various control devices (SBCs), since the MCP4725 is easy to program and understand. It has the following features:

- 12-bit resolution
- On-board nonvolatile memory (EEPROM)
- External A0 address pin
- Normal or power-down mode
- Single-supply operation: 2.7 V to 5.5 V
- Standard (100 kbit/sec), fast (400 kbit/sec), and high (3.4 Mbit/sec) speeds
- Eight available I²C addresses (though any given MCP4725 IC supports only two different addresses, a full range of eight addresses is possible since there are four different variants of the MCP4725, each supporting a different pair of addresses)

For Part III of this book, there are two I²C operations of interest: writing a 12-bit digital value to the DAC and reading the current DAC output and EEPROM values from the chip.

The MCP4725 will respond to one of the following I²C addresses: 0x60/0x61, 0x62/0x63, 0x64/0x65, or 0x66/0x67. An address pin on the MCP4725 provides the LO bit (bit 0) of this address. Bits 1 and 2 are determined by the particular IC you purchase. For example, the Adafruit MCP4725 breakout board uses an IC that responds to addresses 0x62 and 0x63; the SparkFun variant responds to addresses 0x60 and 0x61. If you purchase boards from Adafruit and SparkFun, you can put four of these boards on the same I²C bus without having to resort to using an I²C multiplexer. (There is a sneaky way to hook more of these boards to the same bus by using the address selection bit as a “chip select” line; see <https://mitchronic.blogspot.com/2017/03/addressing-multiple-mcp4724s-in-same.html> for an example.) If you want to use chips with addresses 0x64/0x65 or 0x66/0x67, you could search for various boards on Amazon or build your own breakout board.

Both Adafruit and SparkFun have made their boards open hardware via the Creative Commons license, so you could build these boards and substitute in the appropriate MCP4725 IC. Note that these designs use surface-mounted parts and are not easy to assemble by hand. Check out the Adafruit and SparkFun designs at https://github.com/sparkfun/MCP4725_Breakout/tree/v14 and <https://github.com/adafruit/Adafruit-MCP4725-PCB>. For more information about the MCP4725, see Chapter 15.

