Digital Potentiometers

Expanding its suite of stand-alone analog components for digital designers, Microchip Technology introduced the MCP4XXXX family of six single- and dual-channel digital potentiometers with an SPI&#153 interface. These products combine high performance, a competitive price and sophisticated development tool support, making the MCP4XXXX family an ideal solution for embedded control designs.

Both single- and dual-channel versions are available with resistor values of 10 k ohms, 50 k ohms and 100 k ohms; the wiper position for each potentiometer is changed using a standard SPI serial interface. A software shutdown command in the dual-channel devices provides the means for reducing current consumption while not in use by allowing the user to open circuit each resistor individually. The dual channel devices also feature a shut-down pin that performs the same function.

The MCP4XXXX features high accuracy at 8-bit resolution (256 wiper steps); single supply operation of 2.7-5.5 volts; low static current of 1 uA maximum; and an industrial temperature range of &#150 40 &#176 C to 85 &#176 C. The devices offer INL and DNL of &#177&#150 1 LSB maximum.

In a typical application, the system MCU will send an initialization value at power on; alternatively the potentiometers will reset to mid-scale on power up. The digital potentiometers can be used in both the voltage divider and rheostat modes. The dual-channel devices can be connected in series to simplify communication and control.

The digital solution provides the ability to control system parameters under CPU command if desired. Systems requiring complex calibration or tuning during and after manufacturing can now be automatically calibrated, eliminating the need for manual calibration. Permanent settings can be saved in microcontroller EEPROM during power off. This in-system programmable capability generates cost savings during the manufacturing process and enables remote re-calibration in the field. In addition, the use of digital potentiometers allows automated wave solder-reflow techniques to be used in the manufacturing process.

Applications for the MCP4XXXX family include audio equipment (volume and tone controls), servo-motor control, battery charging and control, communications (line impedance matching), power supplies, instrumentation (gain, offset adjust), LCD contrast control, and programmable filters. The devices can be used in many

existing Microchip customer designs utilizing analog-to-digital converters (ADCs), op amps and microcontrollers.

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