THEORY OF OPERATION

The TC74 is a serially accessible digital temperature sensor that can determine temperatures in the range of 25°C to 85°C with ±2° absolute accuracy or 0°C to 125°C with ±3° absolute accuracy. Temperature information is retrieved from the TC74 via a two wire SMBus/I²C™ compatible interface. The TC74 represents the temperature as an 8-bit two’s complement signed integer that has a direct correspondence to the device’s temperature in degrees C resulting in a 1° temperature resolution. The TC74 is available in eight address versions so that eight devices can be monitored on the same two wire SMBus interface with no additional circuitry.

The PIC16C505 is a 14-pin MCU that can easily interface to the TC74. The PIC16C505 has built in pull-up resistors on several of the PORTB input pins. This feature permits interfacing to the mode control push buttons and the SMBus clock and data lines without any additional circuitry, although care should be taken to ensure that the combination of the PIC16C505 internal pull-up impedance with the cumulative load capacitance meets the timing requirements of the TC74. Proper delay times between clock and data transitions are provided by the application firmware. The PIC16C505 also has an internal oscillator and built in power-up circuitry eliminating the need for additional external components to provide these functions.

This application uses a standard LCD module for temperature display. These modules are made by several manufacturers including Densitron, Epson, Hewlett-Packard, Optrex and Sharp. All of these manufacturer’s modules feature the same interface protocol. The display modules require an enable line, data latch, data direction, and 4 or 8 bits of parallel data. The number of data bits is software selectable during initialization. This particular application uses the 4-bit data option. Other applications may use other means of display or simply control several temperature control devices, such as fans.

The TC74 is available in a 3.3 Vdc configuration and the PIC16C505 operates with supply voltages as low as 3 Vdc making low voltage applications possible.

FIGURE 1: TC74 MULTIPLE TEMPERATURE MONITOR

![Diagram of TC74 multiple temperature monitor](image-url)
Note the following details of the code protection feature on PICmicro® MCUs.

- The PICmicro family meets the specifications contained in the Microchip Data Sheet.
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