

8 Bit PIC® SchmartModule Work Shop

PIC Temperature Meter ***by Bryan Lai, SchmartBoard***

Introduction

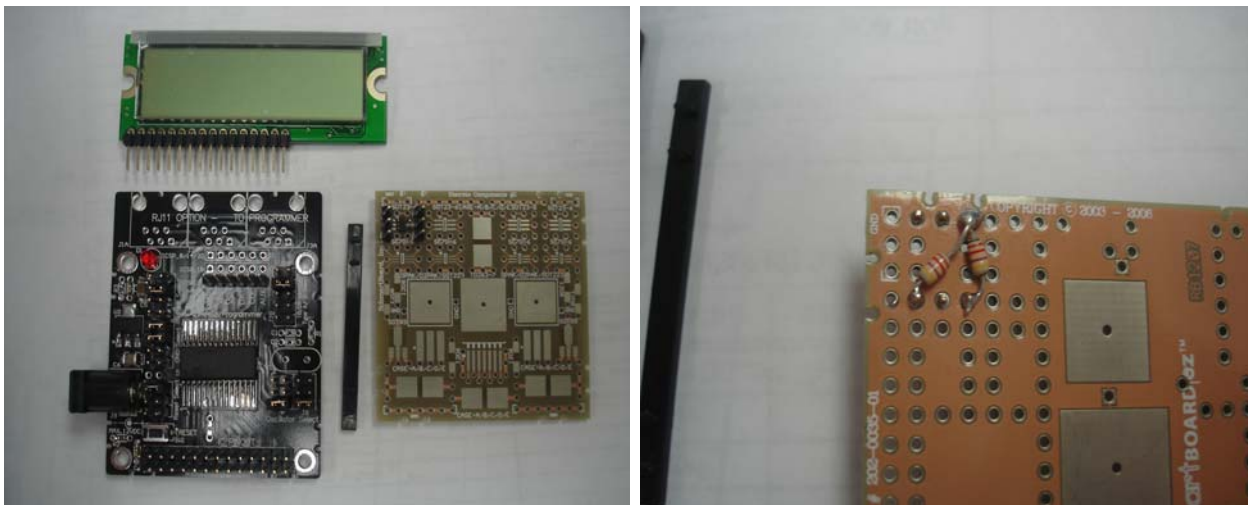
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This project uses a PIC16F886 to read digital temperature data from a thermal sensor and display it on an LCD

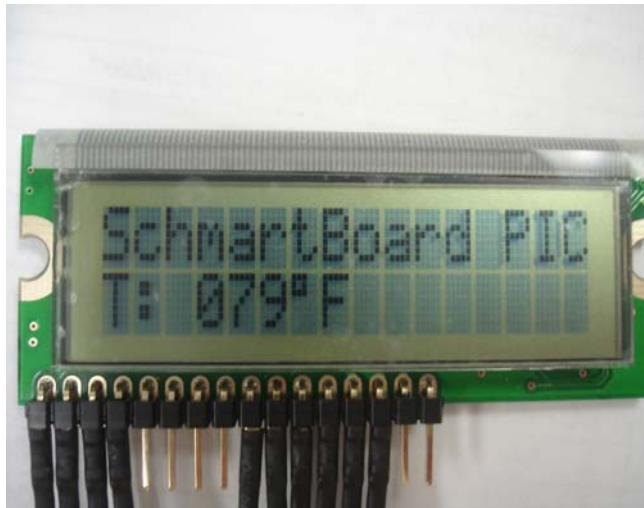
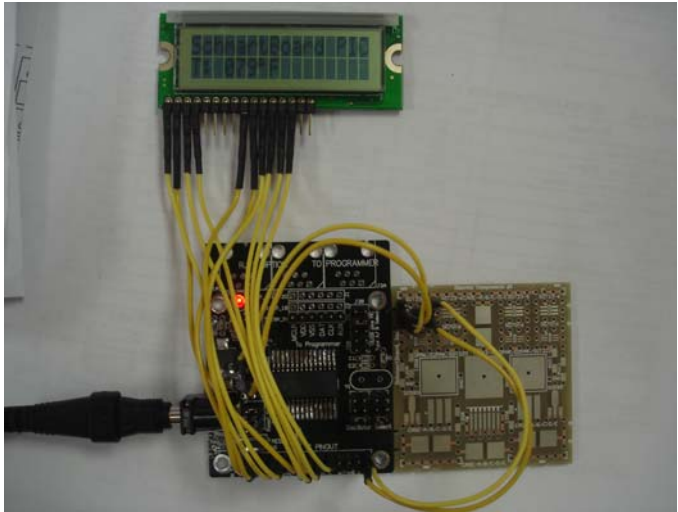
Components and Schmartboards

8 Bit PIC® SchmartModule (710-0004-01),
Discrete Surface Mount SchmartBoard (202-0035-01),
PIC16F886 (SOIC package),
Serial Digital Thermal Sensor (TC74A0-5.0VCT,SOT23-5 package),
4.7K ohm resistor X2,
TN-LCD Module (LCM-S01602DTR+M)
(Qty 2). 5" SchmartBoard Female Jumpers and Headers(920-0006-01)

Schematic and Wiring Information

Solder the SMD chips, other discrete components and headers. EZ SchmartBard Technology will make it simple to solder the SMD chips. Then, referring to the schematic, use jumpers to wire the circuit together. After programming the PIC, just plug in the 6~15V DC power. LCD will start to display the temperature





Sample Code

Demo code is written in C language for HI-TECH C Compilers for PIC10/12/16. Demo will use I2C bus (master mode) get data from TC74. Since the data is a byte of 2's complement in Celsius format, data will be transformed into 3 digits of BCD code in Fahrenheit format.

TABLE 4-4: TEMPERATURE-TO-DIGITAL VALUE CONVERSION (TEMP)

Actual Temperature	Registered Temperature	Binary Hex
+130.00°C	+127°C	0111 1111
+127.00°C	+127°C	0111 1111
+126.50°C	+126°C	0111 1110
+25.25°C	+25°C	0001 1001
+0.50°C	0°C	0000 0000
+0.25°C	0°C	0000 0000
0.00°C	0°C	0000 0000
-0.25°C	-1°C	1111 1111
-0.50°C	-1°C	1111 1111
-0.75°C	-1°C	1111 1111
-1.00°C	-1°C	1111 1111
-25.00°C	-25°C	1110 0111
-25.25°C	-26°C	1110 0110
-54.75°C	-55°C	1100 1001
-55.00°C	-55°C	1100 1001
-65.00°C	-65°C	1011 1111

For the LCD module, the demo use 4bit data bus mode to control.

IDE: MPLAB IDE v8.20 (FREE)

Compiler: HI-TECH C PRO for PIC10/12/16 Lite-mode (FREE)

Link:

http://www.microchip.com/stellent/idcplg?IdcService=SS_GET_PAGE&nodeId=1406&dDocName=en019469&part=SW007002

http://www.microchip.com/stellent/idcplg?IdcService=SS_GET_PAGE&nodeId=1406&dDocName=en535448

Tips and Considerations

- For simplify the circuit, the LCD contrast pin (VO) now is connected to ground. If you would like to adjust, you could use a potentiometer to create a variable Voltage to control contrast of LCD.
- You can have different I2C bus address of TC74

SOT-23 (V)	Address	Code
TC74A0-5.0VCT	1001 000	U0
TC74A1-5.0VCT	1001 001	U1
TC74A2-5.0VCT	1001 010	U2
TC74A3-5.0VCT	1001 011	U3
TC74A4-5.0VCT	1001 100	U4
TC74A5-5.0VCT	1001 101*	U5
TC74A6-5.0VCT	1001 110	U6
TC74A7-5.0VCT	1001 111	U7

For any questions, feel free to contact Bryan Lai at bryan.lai@schmartboard.com