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How to Interface ds1820 with PIC16F877A PIC Development Board (/microcontroller-tutorials/how-to-

interface-ds1820-with-pic16f877a-pic-development-board)

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PIC16F/18F Development Board
(https://www.pantechsolutions.net/microcontroller-boards/pic-development-board)

The **PIC16F/18F Development Board**
(https://www.pantechsolutions.net/microcontroller-boards/pic-development-board)
is specifically designed to help students to master the required skills in the area of
embedded systems. The kit is designed in such way that all the possible features
of the **microcontroller** will be easily used by the students. The kit supports in
system programming (ISP) which is done through USB port.

Microchip's PIC (**PIC16F877A** (https://www.pantechsolutions.net/microcontroller-
boards/pic-development-board)), **PIC16F/18F Development Kit**
(https://www.pantechsolutions.net/microcontroller-boards/pic-development-board)
is proposed to smooth the progress of developing and debugging of various
designs encompassing of High speed **8-bit Microcontrollers.**

Temperature Sensor

DS1820 is a **temperature sensor** which is small sensor. The output of sensor
converted to digital that easy connecting with **microcontroller**.

Interfacing ds1820

Fig. 1 shows how to interface the **ds1820 to microcontroller**. As you can see the
first pin is connected to GND, the third pin is connected to VCC & the second pin is
connected to the **Microcontroller**. So when the temperature is sensing, it give the
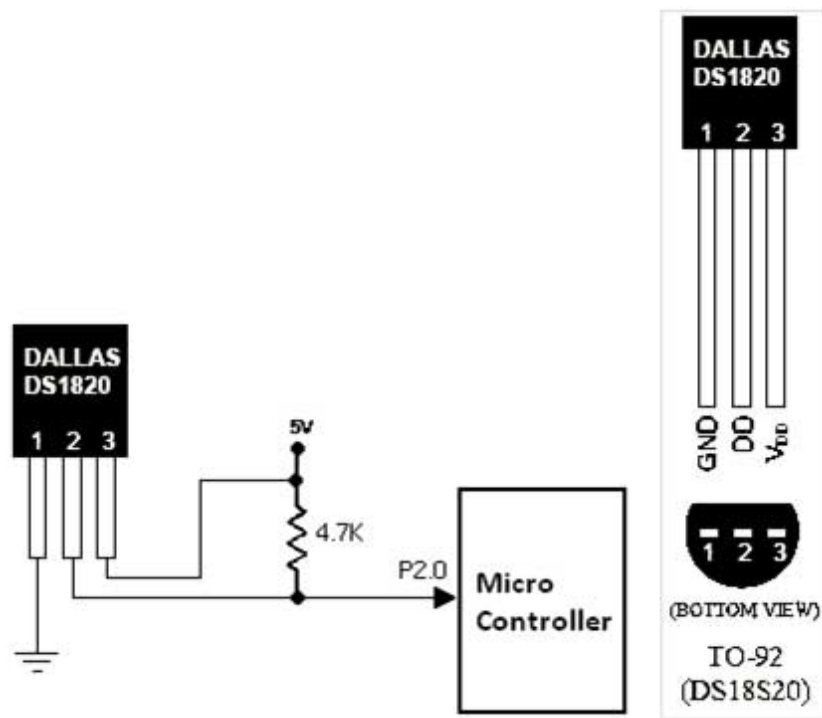**sensor reading to controller.**

Fig. 1 **Interfacing ds1820 to Microcontroller**

Interfacing ds1820 with **PIC16F877A** (https://www.pantechsolutions.net/microcontroller-boards/pic-development-board)

We now want to read the temperature in **PIC16F/18F Development Board** (https://www.pantechsolutions.net/microcontroller-boards/pic-development-board) from **temperature sensor ds1820**. The **PIC16F/18F Development Board** (https://www.pantechsolutions.net/microcontroller-boards/pic-development-board) uses the ADC pin for reading temperature from **temperature sensor ds1820**. The reading output is displayed into PC through UART.

The 10 bit ADC used to read temperature. Basic clocking for the A/D converters is provided by the VPB clock. A programmable divider is included in each converter, to scale this clock to the 4.5 MHz (max) clock needed by the successive approximation process. A fully accurate conversion requires 11 of these clocks.

Pin Assignment with **PIC16F877A** (https://www.pantechsolutions.net/microcontroller-boards/pic-development-board)

	Temp Sensor	PIC16F/18F Development Board (https://www.pantechsolutions.net/microcontroller-boards/pic-development-board) Lines	Temperature Sensor
Ds1820	Temp Output	PORTC.0	PIC16F877A

Circuit Diagram to Interface ds1820 with **PIC16F877A** (https://www.pantechsolutions.net/microcontroller-boards/pic-development-board)
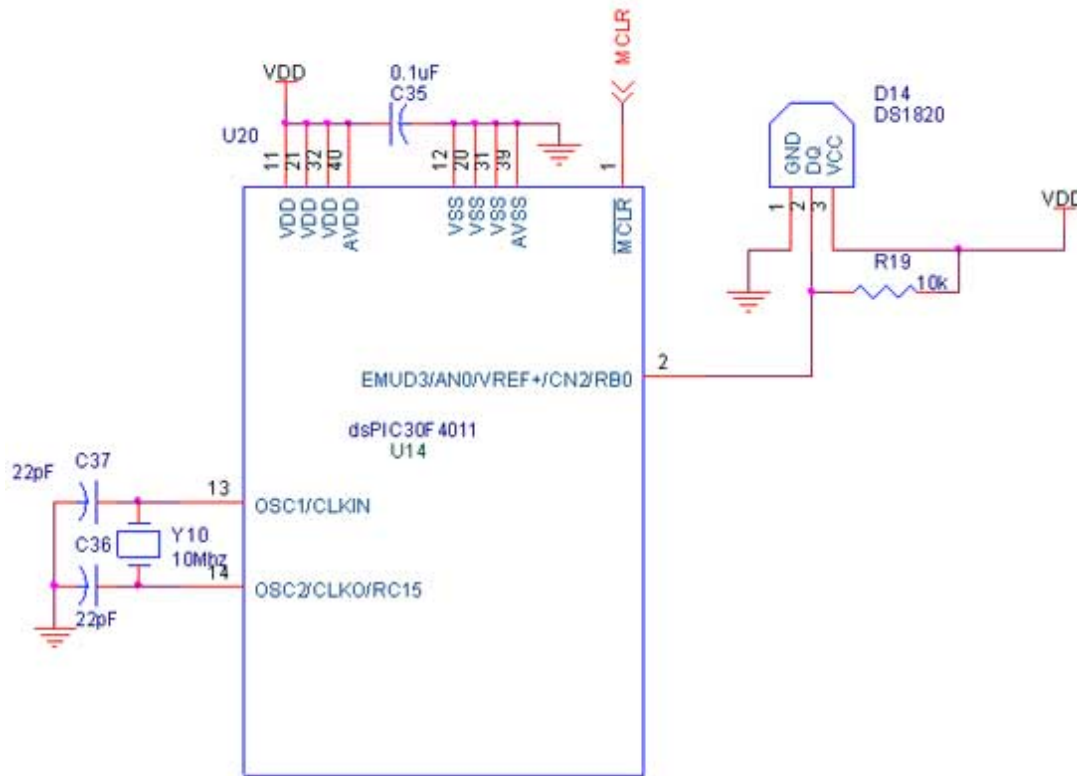
Source Code

The **Interfacing ds1820 with PIC16F877A
(https://www.pantechsolutions.net/microcontroller-boards/pic-development-
board)** program is very simple and straight forward, that reading temperature from
temperature sensor ds1820 and it display into PC through serial port.

C Program to read temperature using **PIC16F877A**
(https://www.pantechsolutions.net/microcontroller-boards/pic-
development-board)

```
********************************************************************************


            Title : Program to read temperature


********************************************************************************
```

```c
#include

#include

#include "delay.c"

__CONFIG(0x3f72);

#define DQ RC0

#define DQ_DIR TRISC0

#define FOSC 10000 #define BAUD_RATE 9.6

// 9600 Baudrate

#define BAUD_VAL (char)(FOSC/ (16 * BAUD_RATE )) - 1;

// Calculation For 9600 Baudrate @10Mhz unsigned char i=0;

float Temerature=0; void ds1820_init();

void Reset(void);

void write(unsigned char);

unsigned char Read(void);

void Serial_init();

void main()

{

unsigned char Temp[9];

DelayMs(100);

Serial_init();

ds1820_init();

DelayMs(100);

printf("\033[2J");

// Clear the Hyper terminal;

while(1)

{

Reset();

write(0xcc);

write(0x44);
```

```
DQ_DIR = 1;

DelayUs(10);

while(!DQ);

// this will be raised after finishing conversion Reset();

write(0xcc);

write(0xbe);

for(i=0;i<9;i++)

Temp[i] = Read();

// Read 9 bytes for(i=0;i<9;i++) printf("%d ",Temp[i]);

printf("Temperature:%3.1f%cC",(float)Temp[0]/2,0xf8); printf("\r");

DelayMs(250);

DelayMs(250);

DelayMs(250);

DelayMs(250);

}

}

void ds1820_init()

{

DQ = 1;

DQ_DIR = 1;

// pull up

}

void Reset(void)

{

DQ_DIR = 0;

DQ = 0;

DelayMs(1);

DelayUs(250);

// 500us DQ_DIR = 1;
```

```
DelayUs(100);

// 40us while(DQ==1);

// wait until presence pulse DelayMs(1);

DelayUs(250);

// 500us

}

void write(unsigned char cmd)

{

for(i=0;i<8;i++)

{

DQ_DIR = 0;

// pull down DQ = 0;

DelayUs(25);

// 10us DQ = (cmd & 0x01)?1:0;

// Send bit cmd = cmd >> 1;

DelayUs(120);

// >45us DQ_DIR = 1;

// release

}

}

unsigned char Read(void)

{

unsigned char temp=0,RecDat=0;

for(i=0;i<8;i++)

{

DQ_DIR = 0;

DQ = 0;

// pull down DelayUs(25);

// 10us DQ_DIR = 1;
```

```
// release DelayUs(25);

// 10us temp = DQ;

// read bit temp = temp<<i;

RecDat |= temp;

DelayUs(70);

// 30us

}

return RecDat;

}

void Serial_init()

{

TRISC=0xc0;

// RC7,RC6 set to usart mode(INPUT) TXSTA=0x24;

// Transmit Enable SPBRG=BAUD_VAL;

// 9600 baud at 10Mhz RCSTA=0x90;

// USART Enable, Continuous receive enable TXIF=1;

// Start Transmit } void putch(unsigned char Data)

// data TX required for printf

{

while(TXIF==0);

TXREG = Data;

}
```

To compile the above C code you need the Mplab software & Hi-Tech Compiler. They must be properly set up and a project with correct settings must be created in order to compile the code. To compile the above code, the C file must be added to the project.

In Mplab, you want to develop or debug the project without any hardware setup. You must compile the code for generating HEX file. In debugging Mode, you want to check the port output without Development Board.

The PICKIT2 software is used to download the hex file into your **PIC16F/18F Development Board** (https://www.pantechsolutions.net/microcontroller-boards/pic-development-board) through USB port line.

Testing the ds1820 with **PIC16F877A** (https://www.pantechsolutions.net/microcontroller-boards/pic-development-board)

Give +12V power supply to **PIC16F/18F Development Board** (https://www.pantechsolutions.net/microcontroller-boards/pic-development-board); the serial cable is connected between the controller and PC. Open the Hyper Terminal screen, select which port you are using and set the default settings. Now the screen should show the **current temperature readings.**

Bring a Hot soldering iron tip near the **ds1820**'s pins, don't touch it keep it 1 or 2mm away. The screen should update with the rising temperature. Now finally touch the pins of **ds1820** with the tip of iron, the temperature should rise quickly. Keep it there until temperature rise to 80 degrees, and then remove the iron.

If any data is not coming in Hyper Terminal, then you just check the serial cable is working or not. Otherwise you just check the code with debugging mode in Mplab. If you want to see more details just see the videos in below link.

- How to Create & Debug a Project in Mplab using PIC16F using Hi-Tech Compiler. (http://youtu.be/2-AtYs83-Ig)

General Information

- For proper working use the components of exact values as shown in Circuit file. Wherever possible use new components.
- Solder everything in a clean way. A major problem arises due to improper soldering, solder jumps and loose joints.
- Use the exact value crystal shown in schematic.
- More instructions are available in following articles,

Interfacing UART with PIC16F877A PIC Development Board (https://www.pantechsolutions.net/microcontroller-tutorials/interfacing-uart-with-pic16f877a-pic-development-board)

User Manual for PIC 16F/18F Development Kit (https://www.pantechsolutions.net/microcontroller-tutorials/user-manual-for-pic-16f-18f-development-kit)

Create & Debug a project in Mplab using PIC16F877A
(https://www.pantechsolutions.net/microcontroller-tutorials/creating-debugging-a-
project-in-mplab)

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PIC BOARDS : PIC16F877A Development Board (https://www.pantechsolutions.net/microcontroller-boards/pic-development-board) | PIC Advanced Development board (https://www.pantechsolutions.net/microcontroller-boards/pic-advanced-development-board)

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