

AppKit:

Using the DS1620 Digital Thermometer/Thermostat

This AppKit shows how to use the Dallas Semiconductor DS1620 Digital Thermometer/Thermostat chip with PIC microcontrollers and the Parallax BASIC Stamp® single-board computer.

Description

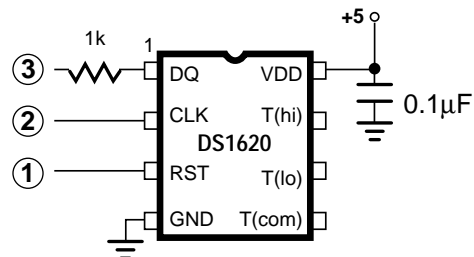
The DS1620 is a complete digital thermometer on a chip, capable of replacing the normal combination of temperature sensor and analog-to-digital converter in most applications. It can measure temperature in units of 0.5° Centigrade (C) from -55° C to +125° C. [In Fahrenheit (°F), units of 0.9° F and a range of -67° F to +257° F.] Temperature measurements are expressed as nine-bit, two's complement numbers. The DS1620 communicates with a microcontroller such as the PIC or Stamp through a three-wire serial connection.

The DS1620 can also operate as a standalone thermostat. A temporary connection to a controller establishes the mode of operation and high/low-temperature setpoints. Thereafter, the chip independently controls three outputs: T(hi), which goes active at temperatures above the high-temperature setpoint; T(lo), active at temperatures below the low setpoint; and T(com), which goes active at temperatures above the high setpoint, and stays active until the temperature drops below the low setpoint.

Hardware interface

The DS1620 interfaces with controllers through a three-wire connection, consisting of a data input/output line (DQ), a synchronizing clock line (CLK) and a reset/select line (RST).

The figure shows how to connect the DS1620 to the PIC or Stamp for the demo programs. Do not omit the bypass capacitor—not even if you feel that your power supply is solid and well-filtered. Locate that cap as close as practical to the supply leads of the DS1620. Although the 1k resistor is not strictly necessary as long as the firmware is functioning correctly, it's best to leave it in. In the event that both the controller (PIC or Stamp) and the DS1620 try to drive the data line at the same time, the resistor limits the amount of current that can flow between them to a safe value.



	PIC	Stamp
①	ra.0	pin 0
②	ra.1	pin 1
③	ra.2	pin 2

Software interface

From a software standpoint, using the DS1620 boils down to this:

- (1) Activate RST by taking it high.
- (2) Send an instruction (protocol) to the DS1620 telling it what you want to do.
- (3) If you are reading data, shift it into the controller (PIC or Stamp).
- (4) If you are writing data, shift it out to the DS1620.
- (5) Deactivate RST by taking it low.

The program listings and data sheets show these processes in detail.

Tips for using the DS1620

- Data written to the DS1620 configuration or temperature-setpoint registers is stored in EEPROM. It takes as long as 50 milliseconds (ms) to complete the write. Be sure to program a delay of at least this length before sending further commands to the DS1620.
- The fastest the DS1620 can generate new temperature data is once per second. It does no good to read it at shorter intervals—you'll simply read the value of the previous temperature measurement.
- The DS1620's thermostat outputs can source only 1 mA and sink only 4 mA. You'll need a Darlington-transistor or logic-level MOSFET switch to turn on a decent-sized load.
- PIC users: The PIC source code included with this kit covers only communication with the DS1620, not converting or displaying the resulting data. Take a look at the BASIC Stamp code listings for general examples of this. If you need 16-bit math routines to help implement your application, try *The PIC Source Book*, available from:

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