



Keywords: 1-wire, 1wire, temperature sensors, digital temperature sensor, integrated circuits, ICs, DS18S20, May 21, 2002  
digital temp, temp sensor

#### APPLICATION NOTE 203

## DS18B20-PAR/DS18S20-PAR/DS1822-PAR Advantages for Remote Temperature Sensing

*Abstract: This application note describes how the DS18B20-PAR, DS18S20-PAR and DS1822-PAR temperature sensor integrated circuits (ICs) can greatly simplify the mechanical aspects of implementing parasite power in remote or probe type applications, as compared to the DS18B20, DS18S20 and DS1822. "parasite power" is a feature of most 1-Wire® devices, which allows them to derive power directly from the data line. The DS18B20, DS18S20 and DS1822 temperature sensors require that the  $V_{DD}$  pin be connected to ground for parasite-power operation, which may require either a third wire or an awkward jumper connection. In the -PAR devices the need for this connection is eliminated.*

### Introduction

The DS18B20-PAR, DS18S20-PAR, and DS1822-PAR parasite-power 1-Wire digital temperature sensors are ideal for use in remote temperature-sensing applications where space constraints or lack of accessibility make it impractical to use a local power supply. "Parasite power" is a feature of most 1-Wire devices, which allows them to derive power directly from the data line. The -PAR temperature sensor ICs can greatly simplify the mechanical aspects of implementing parasite power in remote applications, as compared to the DS18B20, DS18S20, and DS1822.

### The "-PAR" Advantage

When using the DS18B20, DS18S20, and DS1822 1-Wire temperature sensors in parasite-power mode, the  $V_{DD}$  pin must be connected to ground (GND) for correct operation. In applications where the sensors are attached directly to a printed circuit board, connecting the  $V_{DD}$  pin to GND is a simple matter. However, in applications where the temperature sensor is located at a remote location from the control circuit (e.g., in a temperature probe), this connection can present some mechanical difficulties. In this case there are two ways to make the required connection: run three wires to the temperature sensor and connect the  $V_{DD}$  wire to GND at the circuit board (see **Figure 1**), or connect the  $V_{DD}$  pin to the GND pin at the device (see **Figure 2**). Unfortunately, the first approach adds expense by requiring a wire for the  $V_{DD}$  connection, which is of particular concern if the wires must span long distances, and the second approach is a mechanically awkward solution.

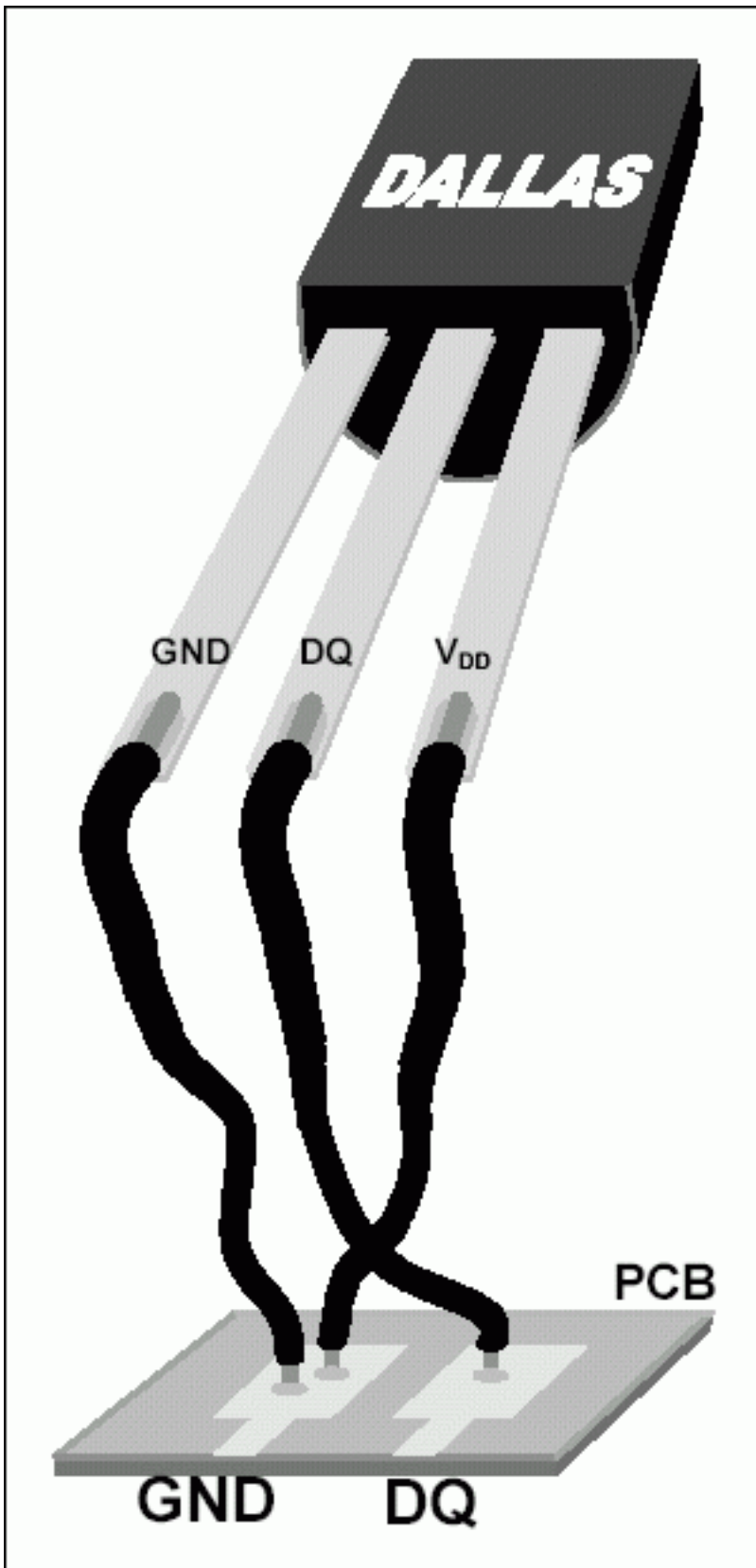


Figure 1. 1-Wire temperature sensor with V<sub>DD</sub> pin connected to GND at PCB.

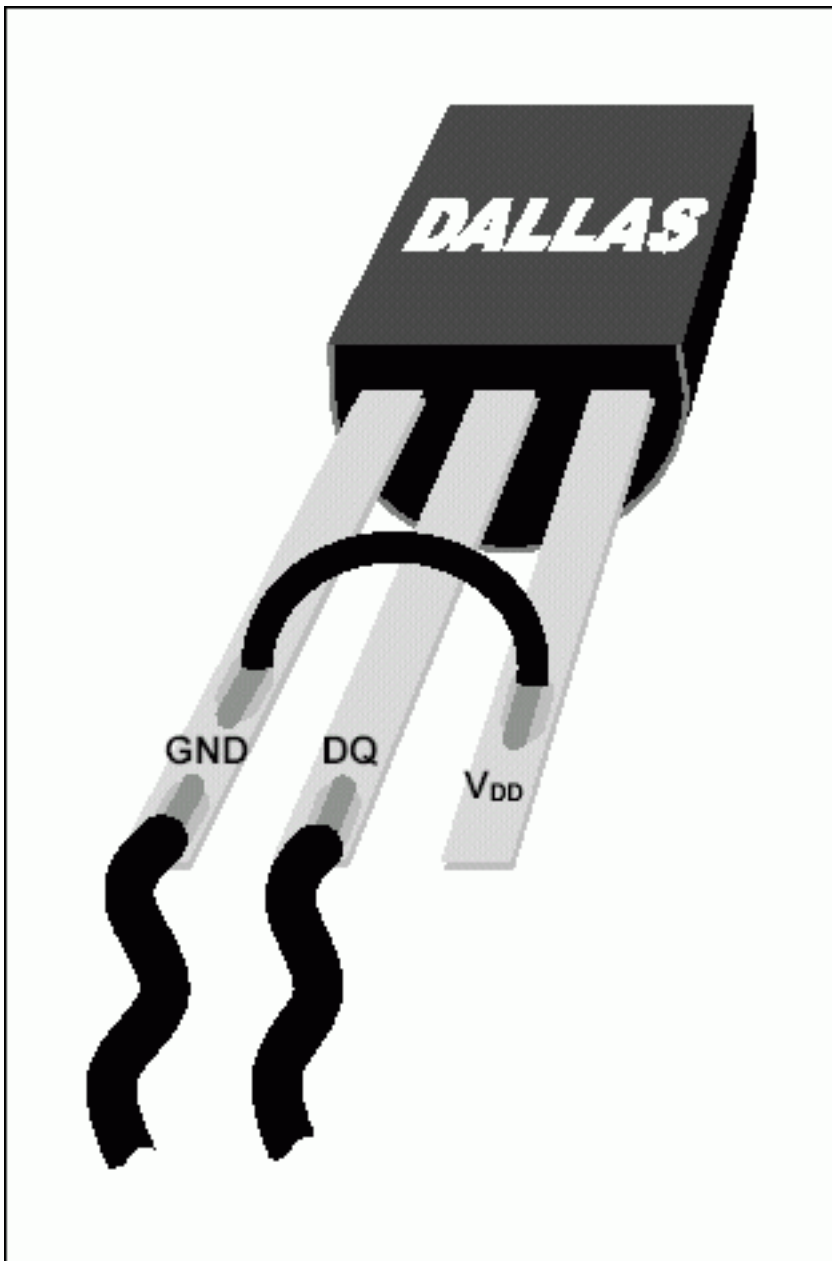


Figure 2. 1-Wire temperature sensor with  $V_{DD}$  pin locally connected to GND.

To solve this problem, Dallas created the DS18B20-PAR, DS18S20-PAR, and DS1822-PAR. These devices are identical to the DS18B20, DS18S20, and DS1822 except that  $V_{DD}$  is internally connected to GND (see **Figure 3**).

Therefore, the three -PAR devices make it simple to implement remote parasite-power operation with minimal wiring or connections (see **Figure 4**).

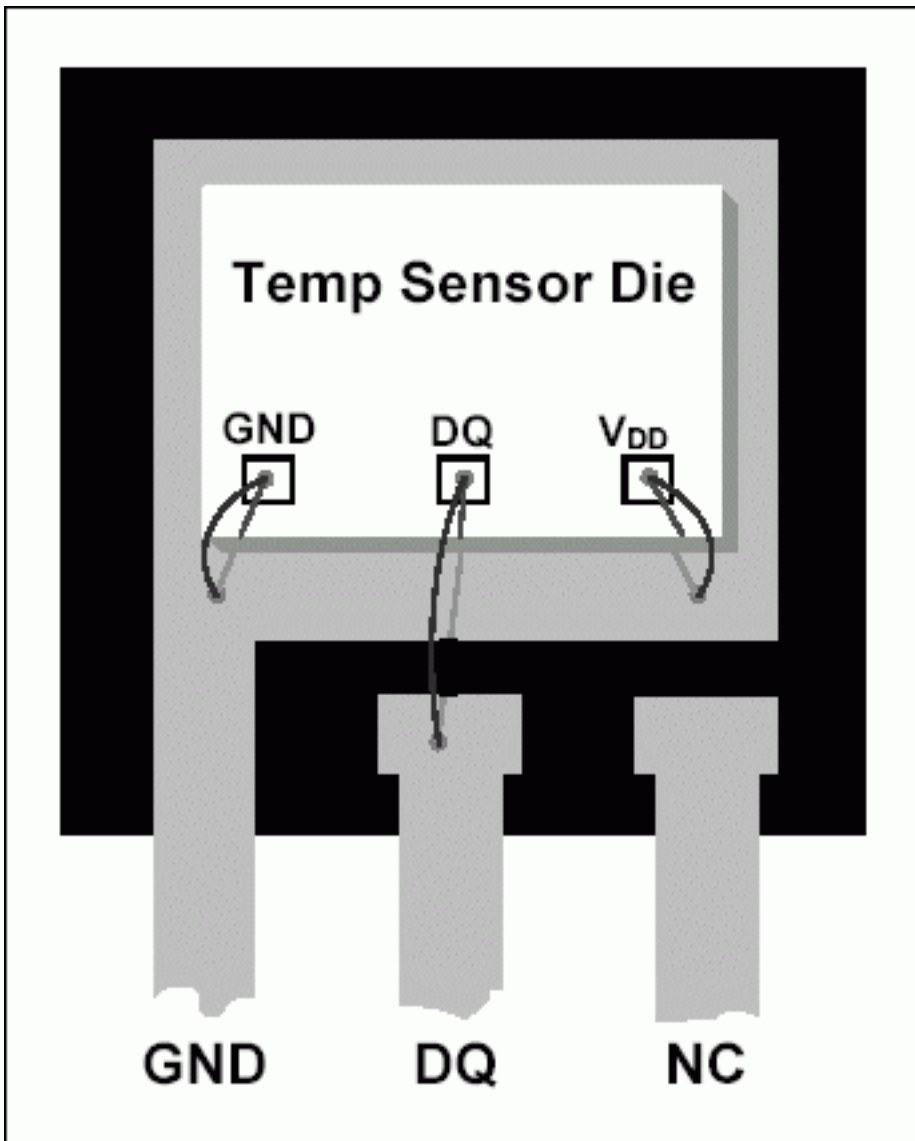


Figure 3. Cutaway view of -PAR temperature sensor.

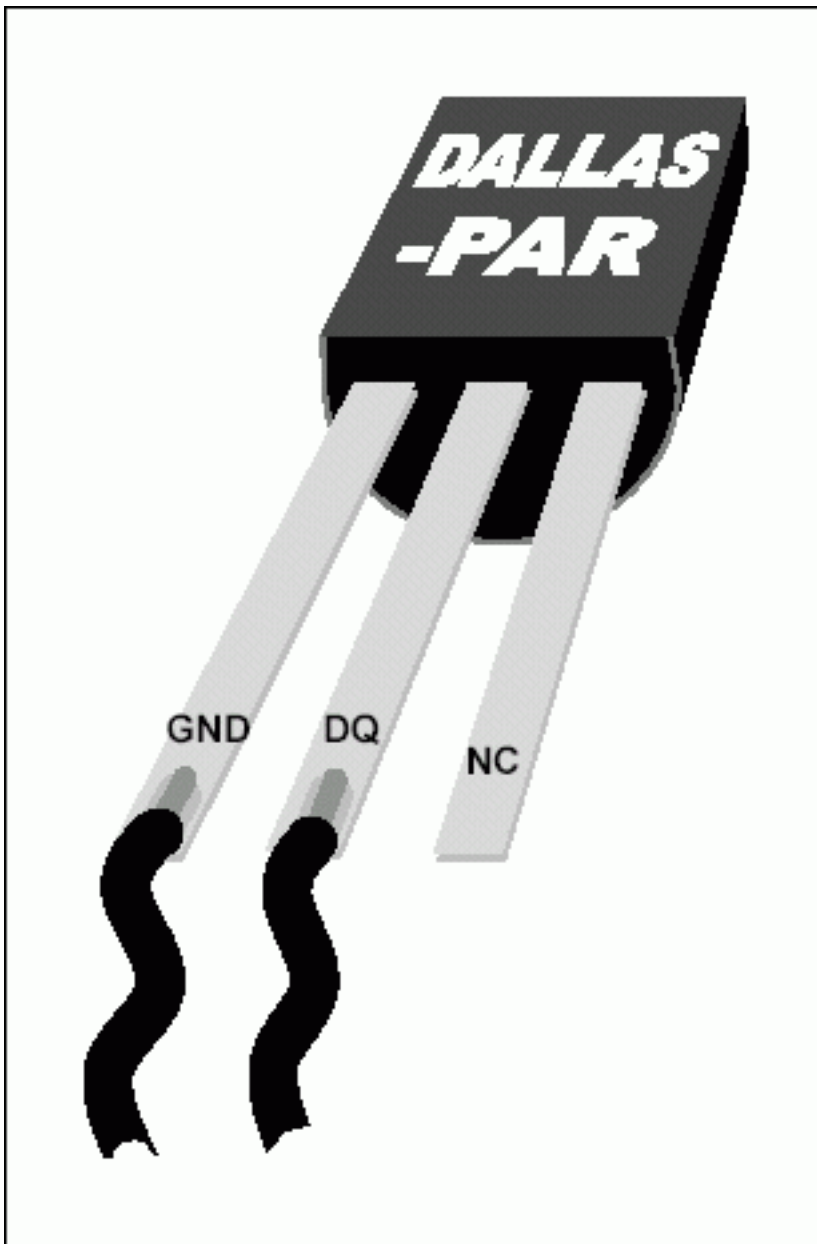


Figure 4. -PAR wiring configuration.

Note that due to increased DQ pin leakage current at high temperatures, the DS18B20-PAR, DS18S20-PAR, and DS1822-PAR have a maximum operational temperature of +100°C. The same is true for the DS18B20, DS18S20, and DS1822 when operated in parasite-power mode.

If you require further information about the DS18B20-PAR, DS18S20-PAR, or DS1822-PAR, or any other Dallas temperature sensor, please contact [Thermal.Support@dalsemi.com](mailto:Thermal.Support@dalsemi.com). DS18B20-PAR, DS18S20-PAR, or DS1822-PAR data sheets can be downloaded from the Maxim website at [www.maxim-ic.com](http://www.maxim-ic.com).

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Application Note 203: <http://www.maxim-ic.com/an203>

#### More Information

For technical questions and support: <http://www.maxim-ic.com/support>

For samples: <http://www.maxim-ic.com/samples>

Other questions and comments: <http://www.maxim-ic.com/contact>

#### Related Parts

DS1822-PAR: [QuickView](#) -- [Full \(PDF\) Data Sheet](#) -- [Free Samples](#)

DS18B20-PAR: [QuickView](#) -- [Full \(PDF\) Data Sheet](#) -- [Free Samples](#)

DS18S20-PAR: [QuickView](#) -- [Full \(PDF\) Data Sheet](#) -- [Free Samples](#)

AN203, AN 203, APP203, Appnote203, Appnote 203

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