

APPLICATION NOTE 4599

# Use a DS3900 to Evaluate I<sup>2</sup>C-Compatible Devices for Successful Bidirectional Communication

By: Jason Andrews

*Abstract: This application note explains the design considerations and hardware requirements for developing a hardware solution to establish I<sup>2</sup>C-compatible communications using a DS3900.*

## Introduction

The [DS3900](#) is used to evaluate I<sup>2</sup>C-compatible components, and it provides fast, bidirectional communication with 2-wire devices using a PC's serial port. **Figure 1** shows the recommended configuration for establishing communications between a DS3900 and an I<sup>2</sup>C-compatible device. An example of a breakout board for the DS3900 is shown in **Figure 2**. This small, efficient PCB (printed circuit board) provides everything necessary for I<sup>2</sup>C communications with the DS3900, and it allows the user to quickly interface with I<sup>2</sup>C-compatible devices.

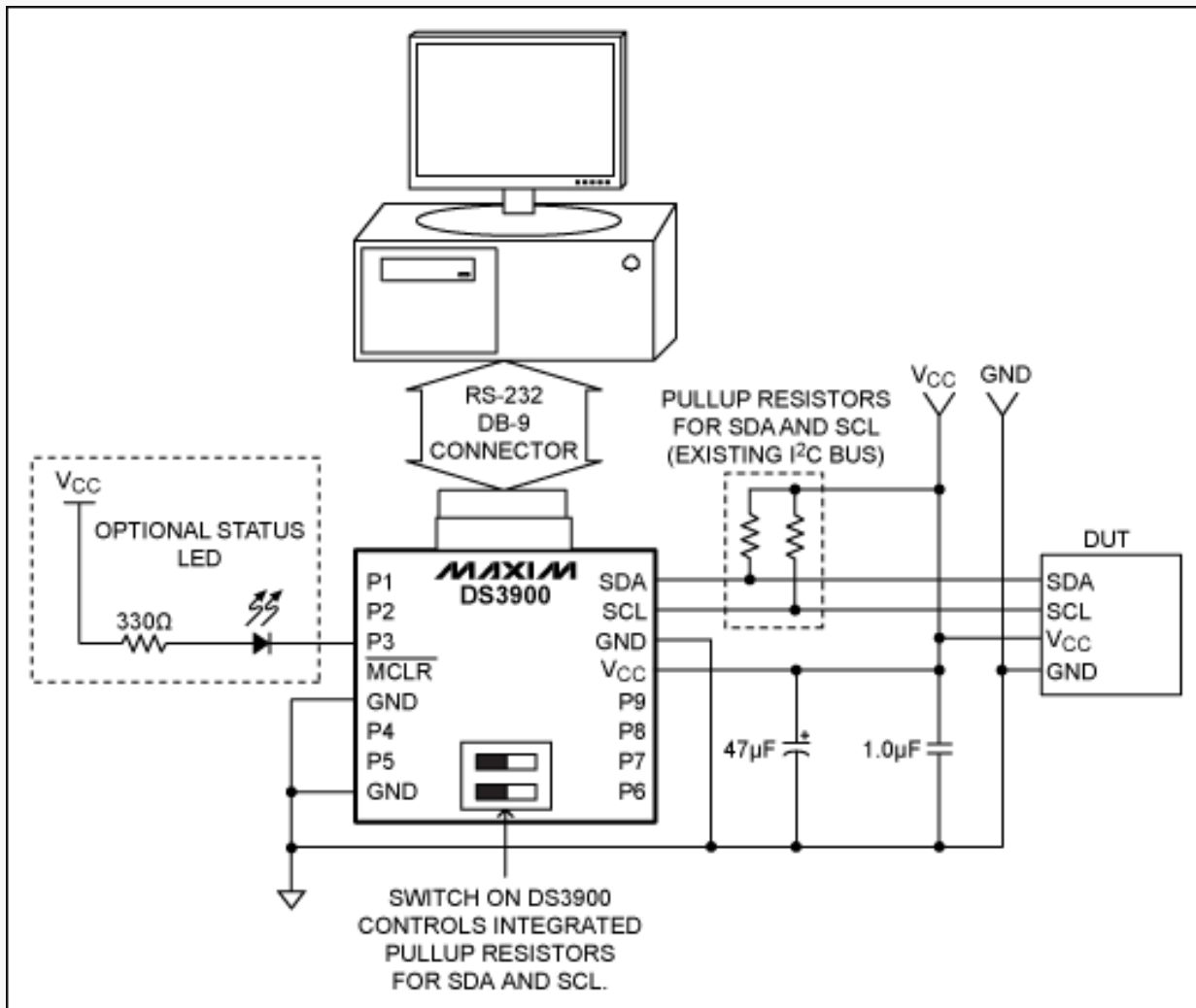
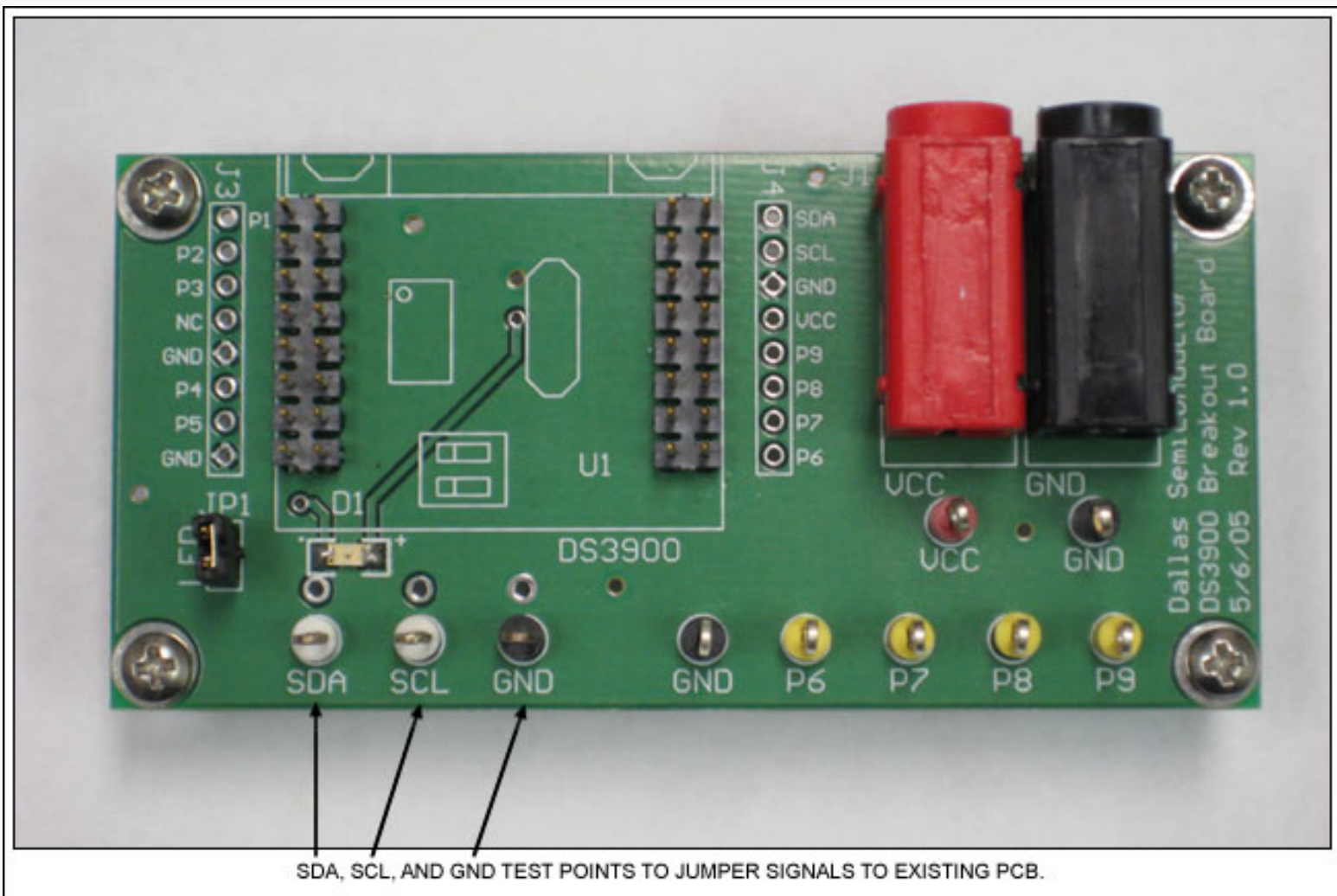


Figure 1. Typical DS3900 interface schematic.



SDA, SCL, AND GND TEST POINTS TO JUMPER SIGNALS TO EXISTING PCB.

Figure 2. Example DS3900 interface board.

There are several notable aspects of the interface that users need to understand. All optional and critical functions of the circuit are detailed below.

## Power-Supply Considerations

Ideally, the DS3900 should be powered by the same supply as the DUT (device under test). By using the same supply for the DUT and the DS3900, the pullup resistors can be tied directly to  $V_{CC}$ . A single decoupling capacitor from  $V_{CC}$  to GND will suffice in most applications. However, the RS-232 transceiver used on the DS3900 can inject noise on the  $V_{CC}$  and GND signals. This noise is significantly reduced when a [47 \$\mu\$ F tantalum capacitor](#)<sup>1</sup> is also used to decouple the supply. The three DS3900 ground pins **MUST ALL BE CONNECTED TO GROUND**. All other unused I/O and the active-low MCLR pins should be left electrically unconnected.

## Pullup Resistor Considerations

The DS3900 can use either the on-board pullup resistors for SDA (Serial Data) and SCL (Serial CLock), or the resistors already employed in an existing application. The switch<sup>2</sup> in Figure 1 controls whether or not the DS3900's on-board resistors are used for the pullup to  $V_{CC}$ . In short, if the DS3900 is to be used on an I<sup>2</sup>C bus that already has pullup resistors, use the switch to disconnect the DS3900's on-board pullup resistors. SDA and SCL can then be attached safely to the target board or component.

## Hardware Considerations

The DS3900 has a number of convenient features. P3 is an open-collector I/O that can be used to drive a status LED. The connection in Figure 1 is made through  $V_{CC}$ , which will affect power-supply currents when the LED is turned on. There are several other I/O pins available on the DS3900; their functions are defined in the DS3900 data sheet.

## Communicating with the DS3900

The communications with the DS3900 are handled by either the [DS3900EVKIT](#) or the I<sup>2</sup>C-specific software included with the Maxim device being evaluated. If no device-specific software exists, the DS3900EVKIT software will be more than sufficient. The DS3900 connects to a PC through the RS-232 port. The evaluation software kits available on the [FTP](#) site are all executables with intuitive user interfaces.

## Conclusion

Things to remember:

1. Use the same supply for the DS3900 and the DUT if at all possible. Use additional decoupling in applications sensitive to supply and GND noise.
2. Make sure that the SDA and SCL pullup resistors are used either on the DS3900 or on the target board.
3. **MAKE SURE THAT ALL THREE (3) GND PINS OF THE DS3900 ARE GROUNDED AND CONNECTED TO THE GND REFERENCE OF THE TARGET BOARD.**

If the preceding recommendations are followed, it will be easy to use the DS3900 to evaluate I<sup>2</sup>C-compatible devices.

## Notes

<sup>1</sup>Digi-Key® offers the 47µF capacitor used for DS3900 evaluation of analog signals. Here the AVX® PN# is used. Any equivalent capacitor will suffice.

<sup>2</sup>The DPDT (dual position, double throw) DIP switch on DS3900 controls pullup resistors.

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## Related Parts

DS3900: [QuickView](#) -- [Full \(PDF\) Data Sheet](#)

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