

## STEPPER MOTOR REFERENCE DESIGN KIT USER'S GUIDE

### 1. Kit Contents

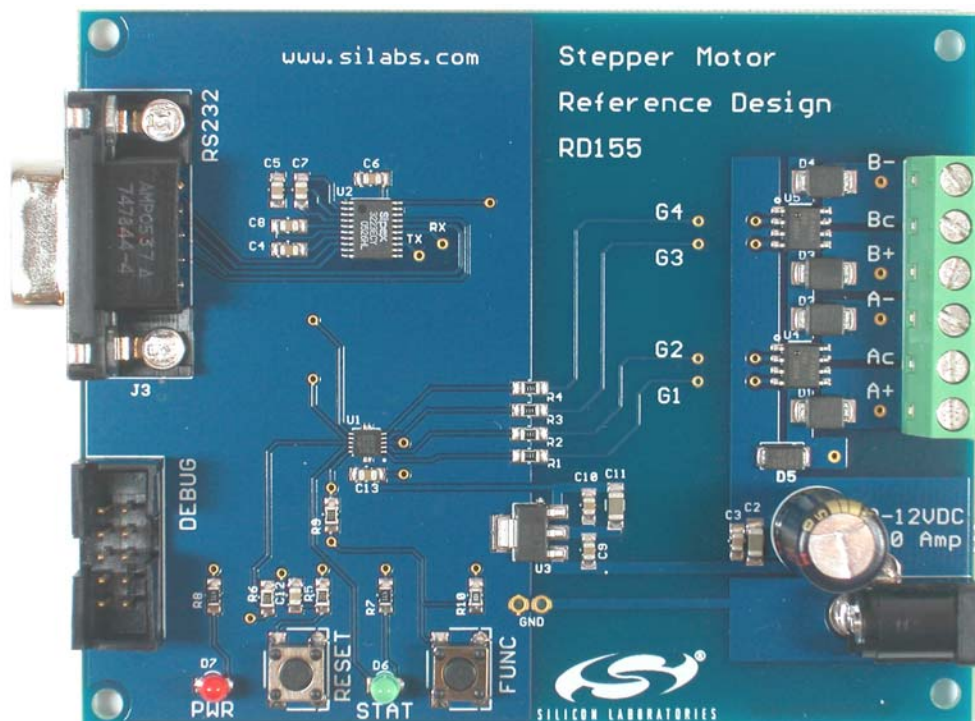
The Stepper Motor Reference Design Kit contains the following items:

- Stepper Motor Reference Design Board
- Stepper Motor
- Universal AC to DC Power Adapter
- USB Debug Adapter
- USB Cable
- Serial Cable
- Reference Design Kit Tools & Documentation CD

### 2. Kit Overview

This reference design demonstrates a high-performance stepper motor system using the C8051F300/1. The reference design provides for both stand-alone demo operation and UART control. The reference design may also be used as a platform for stepper motor code development.

This User's Guide provides a step-by-step guide for getting your system up and running. Refer to the application note "AN155: Stepper Motor Reference Design" for complete documentation of the Stepper Motor Reference Design.



**Figure 1. Stepper Motor Reference Design Board**

# STEPPER-MOTOR-RD

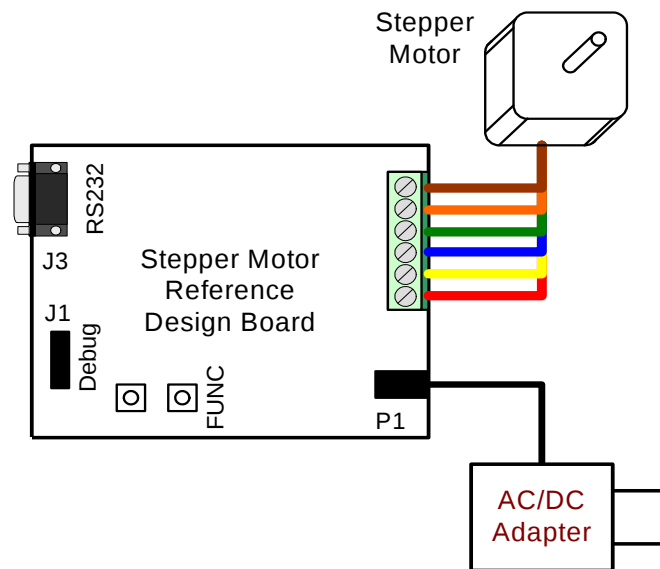
## 3. Stepper Motor Reference Design Demonstration

The Stepper Motor Reference Design includes everything you need to set up a stepper motor demonstration. Connect the stepper motor to the stepper motor control board following the wiring chart for the 42BYG205 motor as shown in Table 1.

**Table 1. GBM 42BY201 Stepper Motor Wiring Diagram**

| Color  | Name |
|--------|------|
| red    | A+   |
| yellow | Ac   |
| blue   | A–   |
| green  | B+   |
| orange | Bc   |
| brown  | B–   |

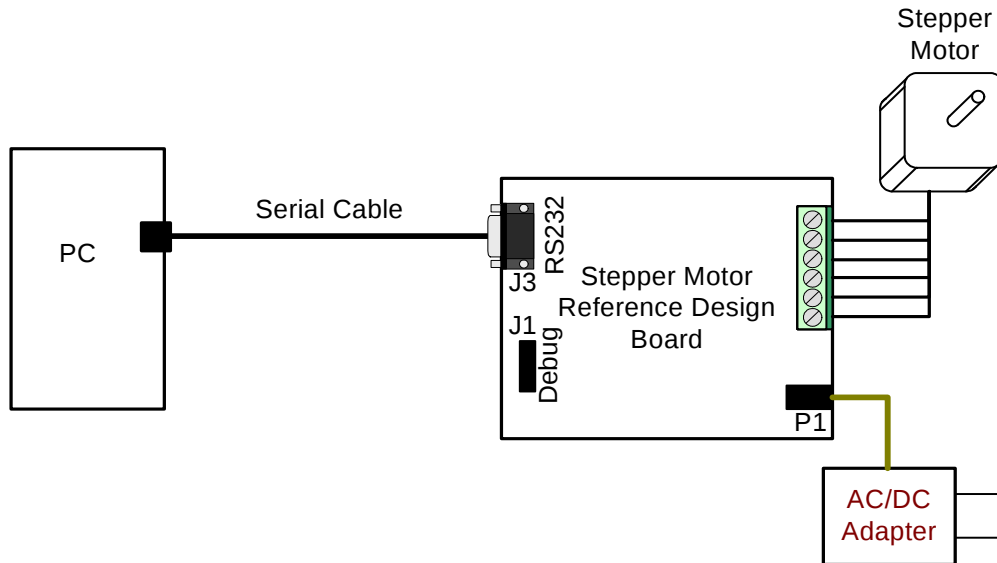
Connect the universal ac/dc power adaptor to the dc supply (P1) on the Stepper Motor Reference Design Board. Press the Function (FUNC) button on the Stepper Motor Reference Design Board. The motor will turn in one direction. Notice that the motor accelerates smoothly up to the maximum speed, moves at a constant speed, and then decelerates smoothly to a standstill. Press the function button again and the motor will turn the other direction.



**Figure 2. Stepper Motor Reference Design Demonstration Setup**

## 4. HyperTerminal Demonstration

Start with the Demo Setup above and add an RS-232 cable connection to your computer as shown in Figure 3. The RS-232 connection is used with a terminal program to provide a basic terminal interface for the stepper motor. If your PC has USB and does not have a serial port, you may use the Silicon Laboratories CP2102 EK to provide a virtual COM port connection.

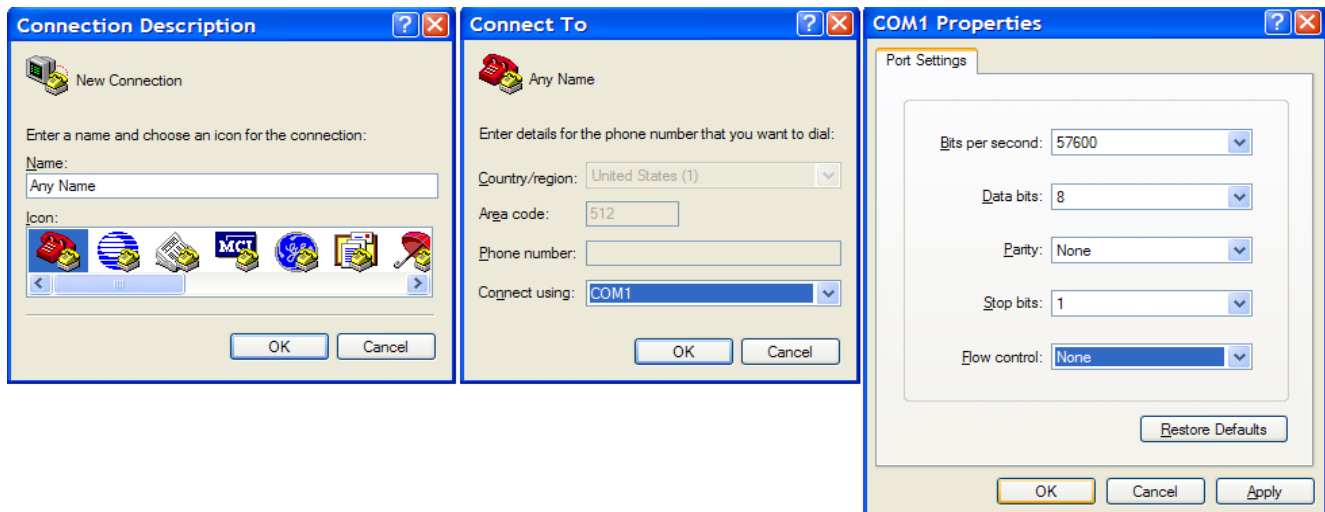


**Figure 3. Stepper Motor Reference Design Terminal Setup**

Open the HyperTerminal application. The HyperTerminal program may be launched on most Windows XP systems from the Start Menu:

Start→Programs→Accessories→Communications→HyperTerminal

Enter any name into the "Connection Description" dialog box as shown in Figure 4. In the "Connect To" dialog box, choose the COM port corresponding to the Serial connection on your PC. In the Port Settings dialog box select 57600 baud and no flow control. Use the default settings of 8 data bits, no parity, and one stop bit.



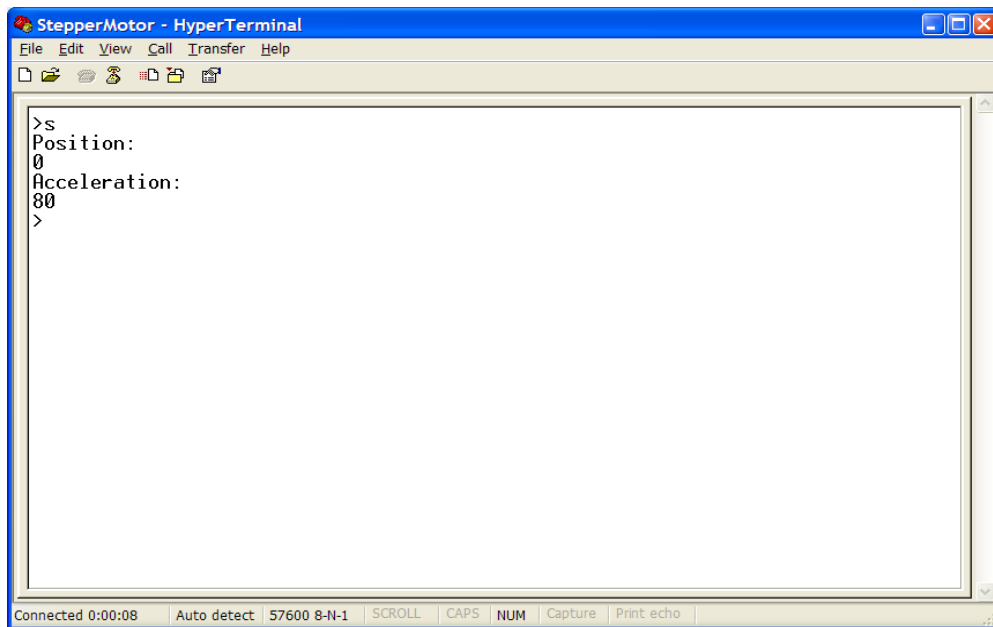
**Figure 4. Setting Up HyperTerminal**

# STEPPER-MOTOR-RD

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Push the Reset button on the Stepper Motor Reference Design Board. When reset, the Stepper Motor Reference Design sends a ">" prompt character to the terminal. If you do not get a prompt character, check your port settings, cable connections, and make sure the Stepper Motor Reference Design Board is powered.

The Stepper Motor Reference Design command line provides some basic terminal commands to display motor status, change position, and change acceleration. Typing an "s" character immediately displays the motor status. Typing a "p" followed by a number and a return moves the motor to the desired position. See "AN155: Stepper Motor Reference Design" for a detailed description of the command line interface.



**Figure 5. Stepper Motor Command Line**

## 5. Development Tool Installation

Install the Reference Design Kit Tools from the Reference Design Kit Tools & Documentation CD. This installs the Silicon Laboratories IDE and the 2k code size limited version of the Keil Compiler.



Figure 6. Install Development Tools

# STEPPER-MOTOR-RD

## 6. Development Setup using the USB Debug Adapter

The Stepper Motor Reference Design includes everything you need to develop your own stepper motor control firmware using the Silicon Laboratories C8051F300/1 MCU. The Stepper Motor reference design code may be used as a starting point for your own code development.

Connect the Stepper Motor, ac/dc power adapter, and serial cable if you have not done so already. Refer to the stepper motor wiring Table 1 on page 2 for the stepper motor connections. Connect the USB Debug Adapter ribbon cable to the 10-pin Debug connector on the Stepper Motor Reference Design Board. Connect the USB Debug Adapter to your PC using the supplied USB cable as shown in Figure 7.

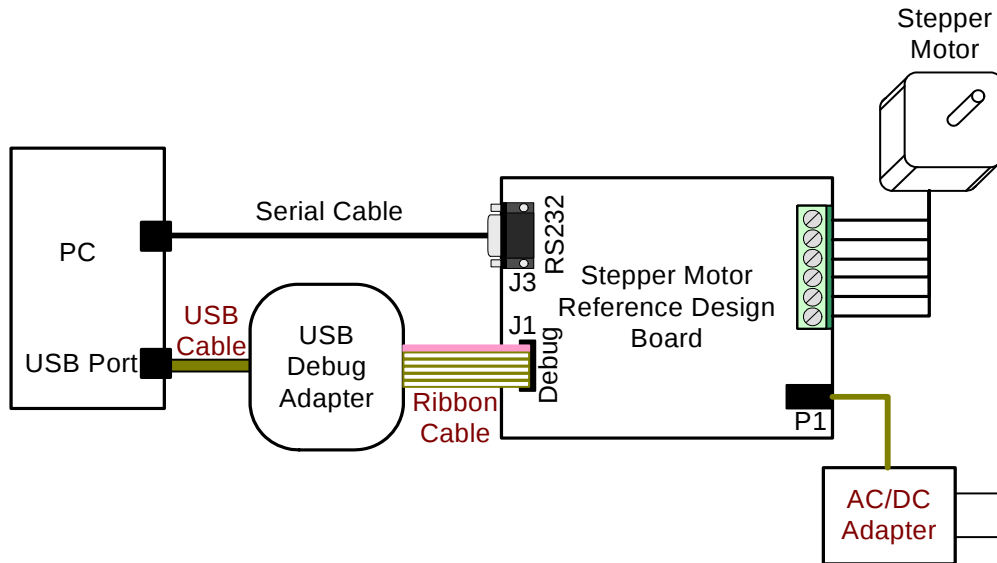


Figure 7. Development Setup using the USB Debug Adapter

## 7. Stepper Motor Project

The source code for the Stepper Motor Reference design is installed from the CD onto your hard drive in the following default location:

C:\SiLabs\MCU\Stepper\_Motor\_RD\firmware\

The software for AN155 is also available as a zip file on the CD or from the Silicon Laboratories website.

To create a stepper motor project, complete the following steps:

1. Launch the Silicon Laboratories IDE from the Start menu.
2. Select "Add Files to Project" from the Project menu.
3. Browse to the source code location listed above, and open the file stepper.c.
4. Double click on Stepper.c in the Project Workspace pane to open.
5. Select "Rebuild All" from the project menu or click on the "Rebuild All" button. (The IDE will compile and link the stepper.c file as shown in Figure 8.)
6. Select "Connection Options" from the Options menu.
7. Make sure the USB Debug Adapter is selected and the Debug Interface is using the C2 connection.
8. Select "Connect" from the Debug menu, or click on the "Connect" button in the tool bar.

The Status Bar should display Target:C8051F301 to indicate the IDE is connected to the MCU on the Stepper Motor Reference Design Board. Refer to the application note AN155 for additional information on the stepper motor code.

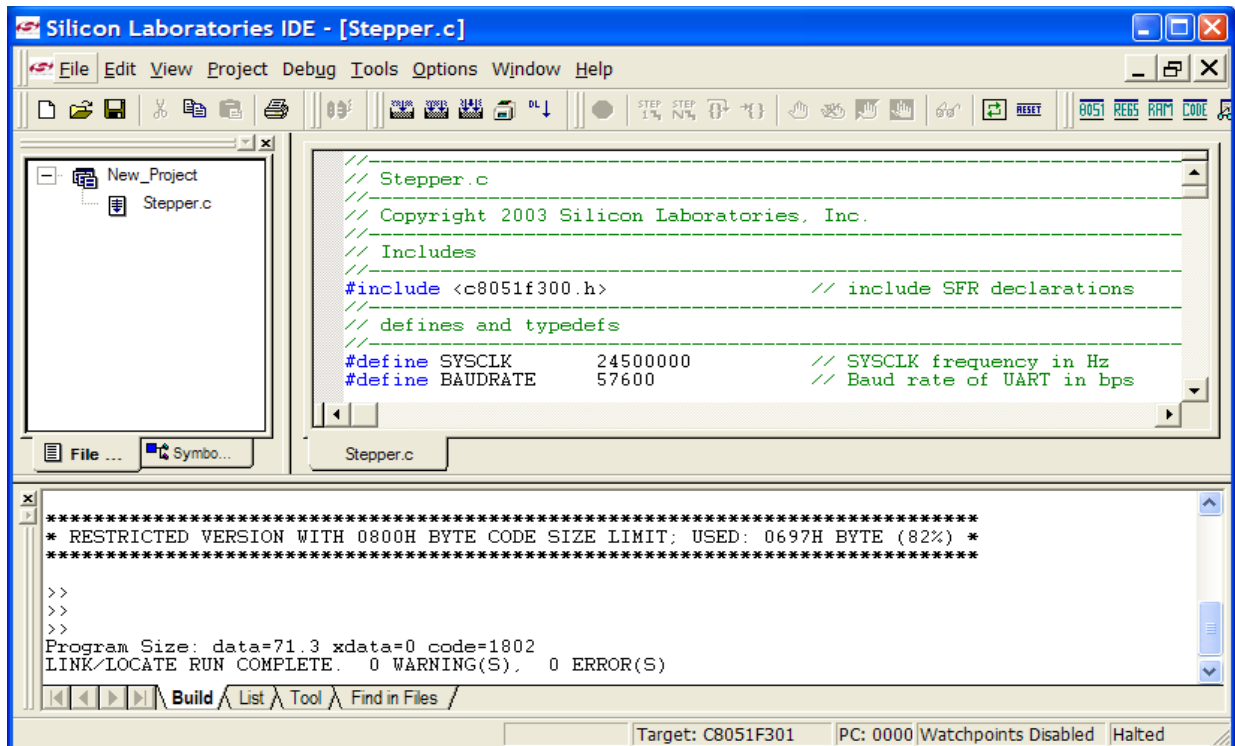


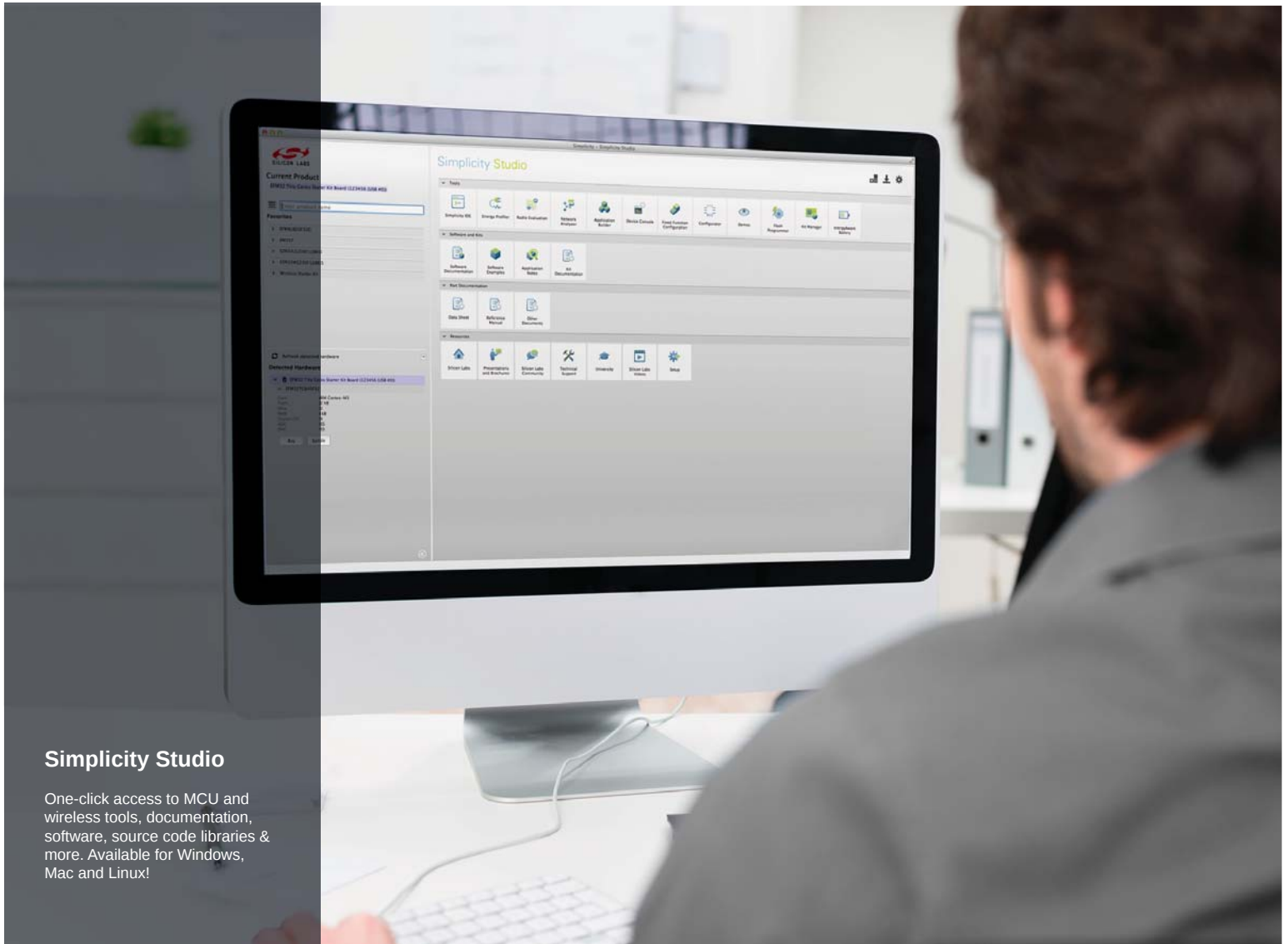
Figure 8. Stepper Motor Project

## 8. Related Documents

- Stepper Motor Reference Design Quick Start Guide
- AN155: Stepper Motor Reference Design

Soft copies of this document and the ones listed above are included on the Reference Design Kit Tools & Documentation CD. Click on Browse Documents to locate them or explore the CD and locate the User's Guides and Application Notes in the Documents folder.

The latest versions of the documentation and software can also be downloaded from the Silicon Laboratories website [www.silabs.com](http://www.silabs.com).



## Simplicity Studio

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