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8-Bit USB Debug Adapter User's Guide

1. Introduction

The 8-bit USB Debug Adapter (UDA) provides the interface between the PC's USB port and the Silicon Labs 8-bit target device's in-system debug/programming circuitry. The 10-pin ribbon cable connects the adapter to the target board and the target device's debug interface.



Figure 1. 8-Bit USB Debug Adapter

Visit www.silabs.com/8bit-uda for ordering information.

2. Relevant Documentation

Application notes can be found on the 8-bit MCU Application Notes web page: www.silabs.com/appnotes.

- **AN124: *Pin Sharing Techniques for the C2 Interface***—Describes in detail the debug interface pin sharing feature for C2 devices, which enables debugging and use of the /RST and GPIO pins shared with C2CK and C2D.
- **AN117: *Using C8051Fxxx On-Chip Interface Utilities DLL***—The SiUtil DLL discussed in this document uses the USB Debug Adapter to program the memory space of C2 and JTAG devices.
- **AN134: *Multiple-Device JTAG Configuration in the Silicon Labs IDE***—Configuration in the IDE and using the USB Debug Adapter for devices in a JTAG chain.

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3. Pinout Specification

The 8-Bit USB Debug Adapter supports both Silicon Laboratories JTAG and C2 debug interfaces, and the adapter is powered from the USB connection to the PC. The UDA is also capable of providing power to the target device or other circuitry via pin 10 of the connector. Table 1 shows the pin definitions for the UDA keyed connector. The part number for the matching shrouded and keyed connector for a PCB is 2510-6002UB from 3M.

The USB Debug Adapter can automatically change the communication voltage level based on the level detected on pin 7 of the connector. As a result, this pin should be pulled high with a strong pull-up (~1 kΩ) for noise immunity purposes and not pulled down to ground.

Notes:

- The USB Debug Adapter requires a target system clock of 32 kHz or greater.
- With the default settings, the USB Debug Adapter can supply up to 100 mA to a target system.

Table 1. USB Debug Adapter Debug Connector Pin Descriptions

Pin #	Description	Details
1	Not Connected	
2	GND (Ground)	
3	GND (Ground)	
4	TCK / C2D	JTAG TCK or C2 Data
5	TMS / C2CK pin share	JTAG TMS or C2 Clock pin sharing
6	TDO / C2D pin share	JTAG TDO or C2 Data pin sharing
7	TDI / C2CK	JTAG TDI or C2 Clock signal This pin is used by the UDA to sense and set the logic voltage level. This pin should never have a pull-down to ground.
8	Not Connected	
9	GND (Ground)	
10	USB Power	5 V power from the UDA

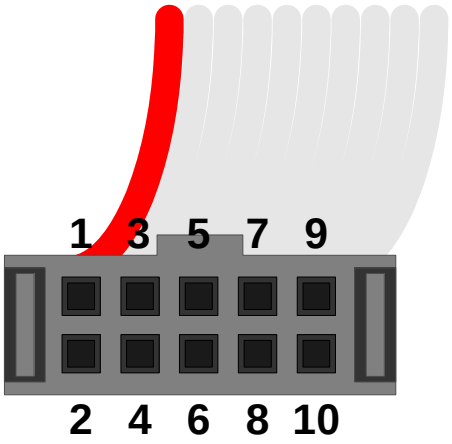


Figure 2. 8-Bit USB Debug Adapter Connector

4. Minimum C2 Programming Connections

The minimum required programming connections for the C2 interface are C2D (pin 4), C2CK (pin 7), and ground (pins 2, 3, or 9).

5. Hardware Setup using a USB Debug Adapter

Connect a target board to a PC running the Silicon Laboratories IDE via the USB Debug Adapter as shown in Figure 3.

1. Connect the USB Debug Adapter's 10-pin ribbon cable to the JTAG or Debug connector on the target board.
2. Connect one end of a standard USB cable to the USB connector on the USB Debug Adapter.
3. Connect the other end of the USB cable to a USB Port on the PC.
4. Power the target board.

Notes:

- Use the **Reset** button in the IDE to reset the target when connected using a USB Debug Adapter.
- Remove power from the target board and the USB Debug Adapter before connecting or disconnecting the ribbon cable from the target board. Connecting or disconnecting the cable when the devices have power can damage the device and/or the USB Debug Adapter.

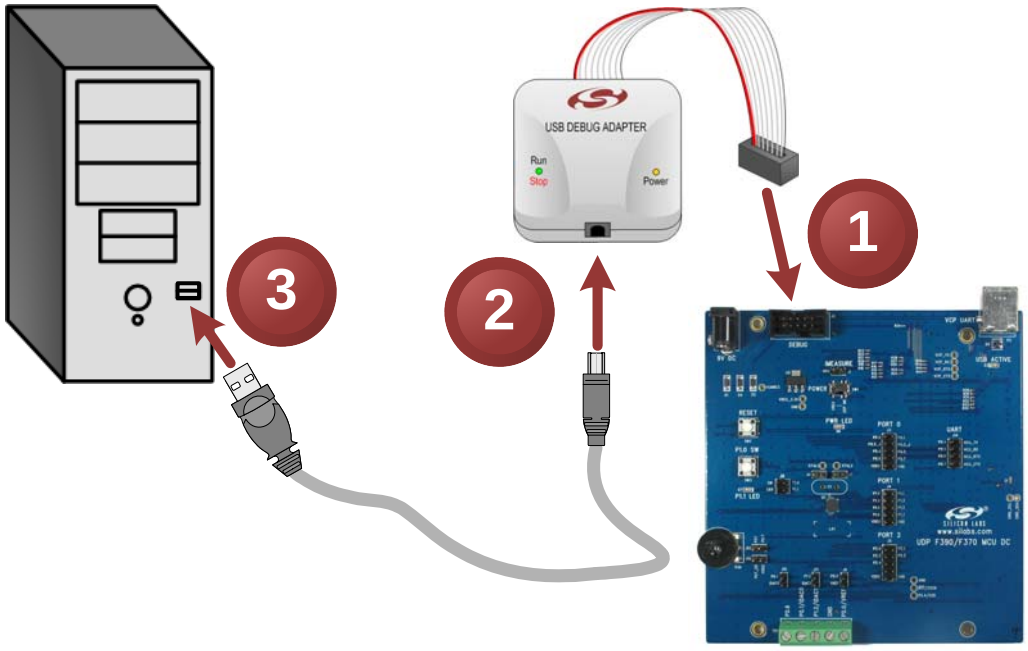


Figure 3. Hardware Setup using a USB Debug Adapter

6. USB Drivers

The USB Debug Adapter uses the Human Interface Device (HID) USB interface to communicate with the PC. Since most operating systems have this driver automatically built in, no drivers need to be installed to use the UDA.

7. Software Setup using a USB Debug Adapter

The Silicon Laboratories Integrated Development Environment (IDE) along with other software tools are provided for device development and debugging. The IDE is available for download from the Silicon Laboratories website (www.silabs.com/mcudownloads) and is also available on microcontroller development kit CD-ROMs.

7.1. Configuring the USB Debug Adapter in the Silicon Labs IDE

Once the IDE has been installed and the hardware has been connected as shown in Section 5, follow the steps below to built a project, connect and download to a target board using the USB Debug Adapter.

1. Select **Project→Open Project...** to open a previously saved project.
2. Before connecting to the target device, several connection options may need to be set. Open the **Connection Options** window (shown in Figure 4) by selecting **Options→Connection Options...** in the IDE menu.
3. Select USB Debug Adapter in the **Serial Adapter** section.
4. If more than one adapter is connected, choose the appropriate serial number from the drop-down list.
5. Check the **Power target after disconnect** option if the target board is currently being powered by the USB Debug Adapter. The board will remain powered after a software disconnect by the IDE.
6. Next, the correct **Debug Interface** must be selected. Check the **Debug Interface** corresponding to the Silicon Laboratories device on the target board.
7. Once all the selections are made, click the **OK** button to close the window.
8. Click the **Connect** button in the toolbar or select **Debug→Connect** from the menu to connect to the device.
9. Download the project to the target by clicking the **Download Code** button in the toolbar.
10. Save the project when finished with the debug session to preserve the current target build configuration, editor settings and the location of all open debug views. To save the project, select **Project→Save Project As...** from the menu. Create a new name for the project and click on **Save**.

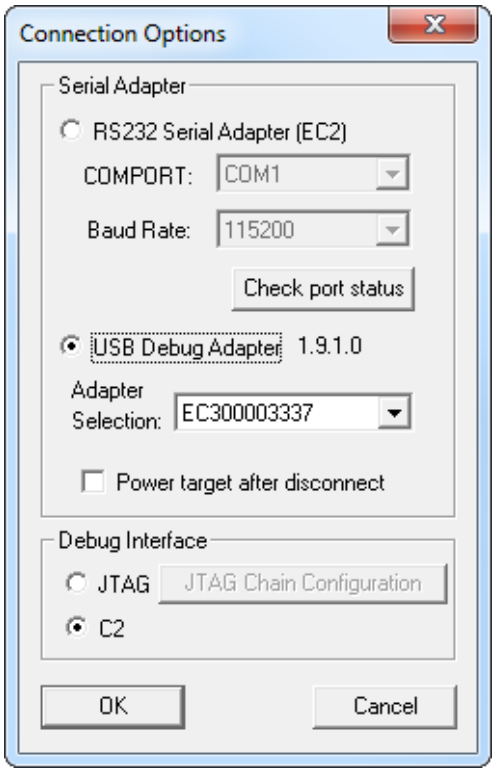


Figure 4. Connection Options

8. Schematics

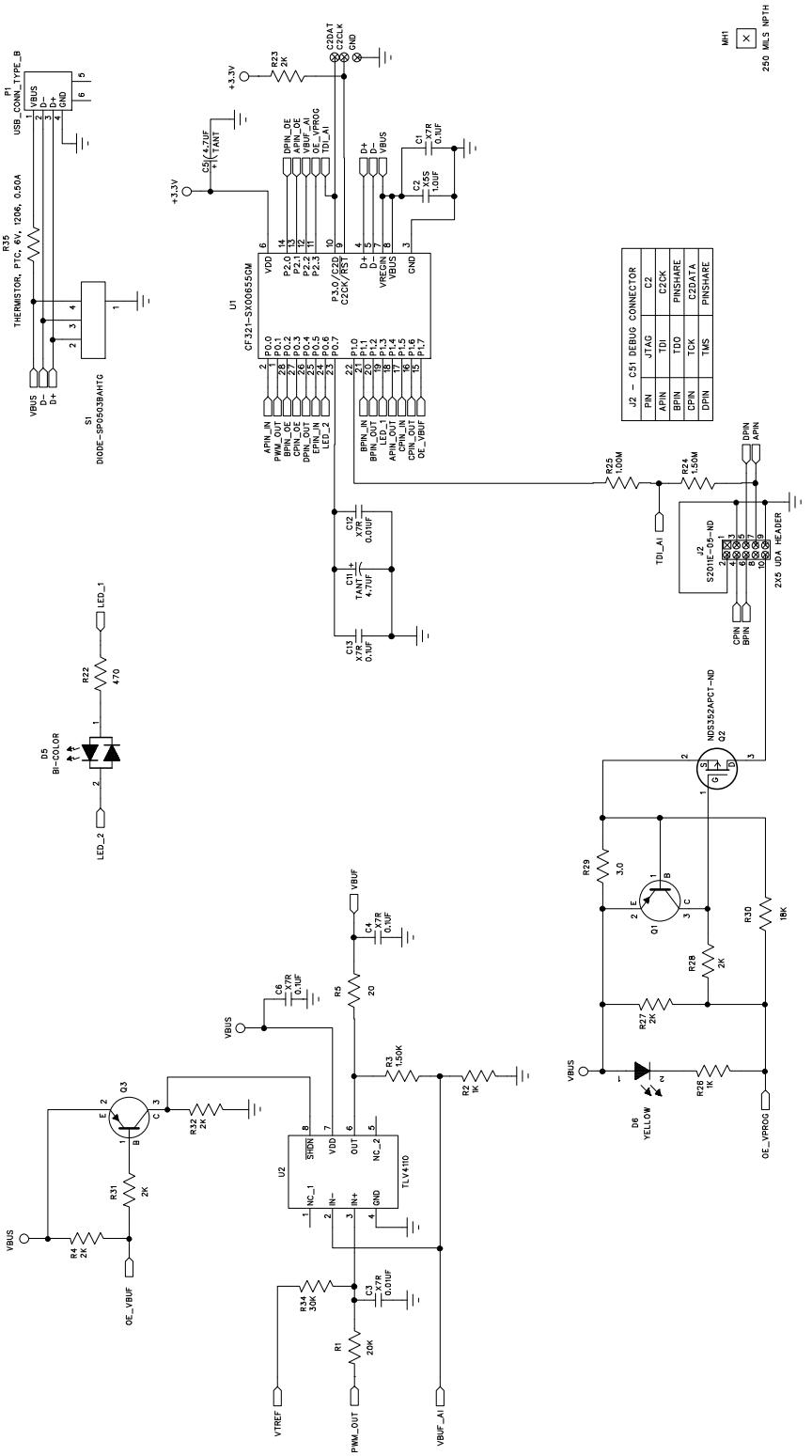


Figure 5. 8-Bit USB Debug Adapter Schematic (1 of 2)

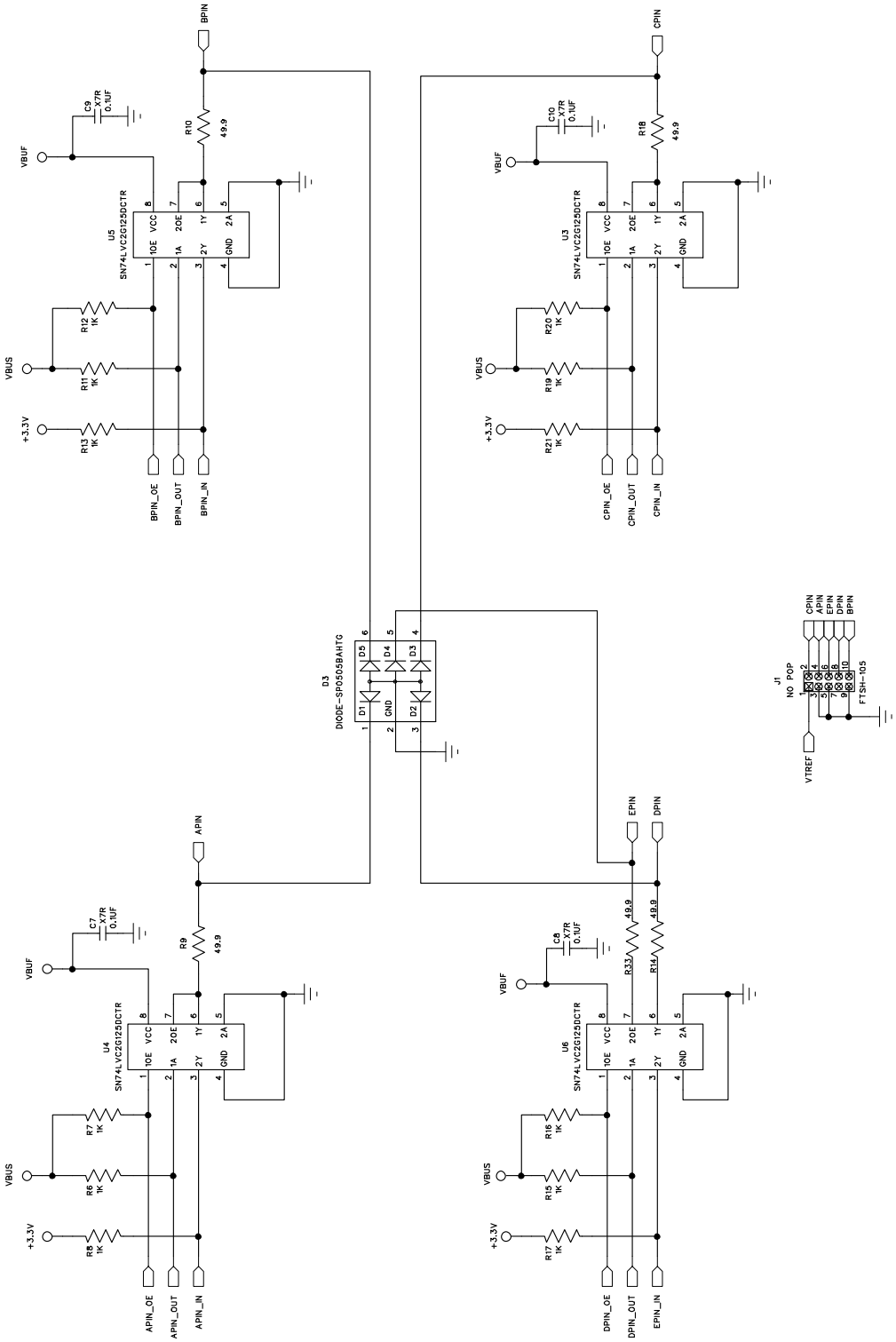
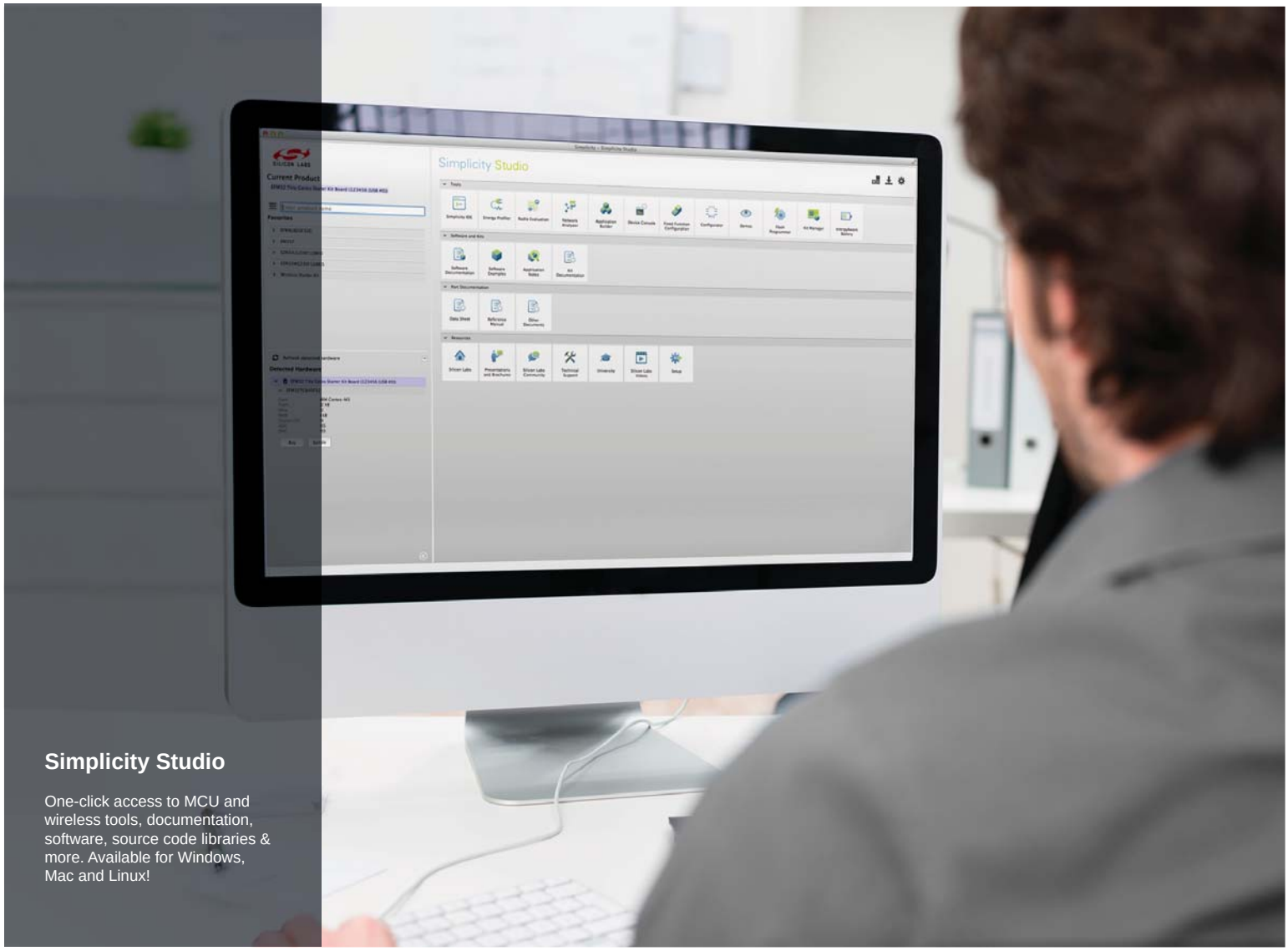


Figure 6. 8-Bit USB Debug Adapter Schematic (2 of 2)



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