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## C8051F326 DEVELOPMENT KIT USER'S GUIDE

### 1. Kit Contents

The C8051F326/7 Development Kit contains the following items:

- C8051F326 Target Board
- C8051Fxxx Development Kit Quick-Start Guide
- USB Cable
- AC to DC Power Adapter
- USB Debug Adapter (USB to Debug Interface)
- USB Cable

### 2. Hardware Setup using a USB Debug Adapter

The target board is connected to a PC running the Silicon Laboratories IDE via the USB Debug Adapter as shown in Figure 1.

1. Connect the USB Debug Adapter to the **DEBUG** connector on the target board with the 10-pin ribbon cable.
2. Connect one end of the 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. Connect the ac/dc power adapter to power jack **P1** on 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.

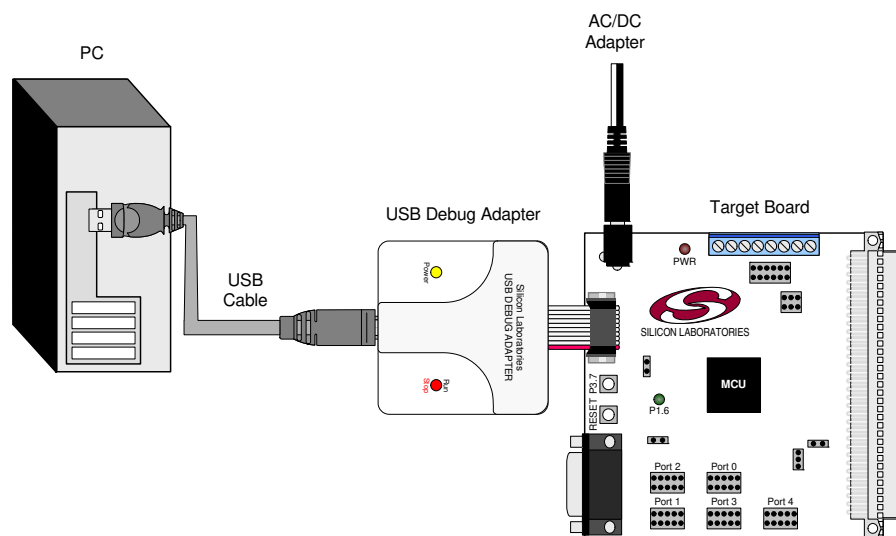
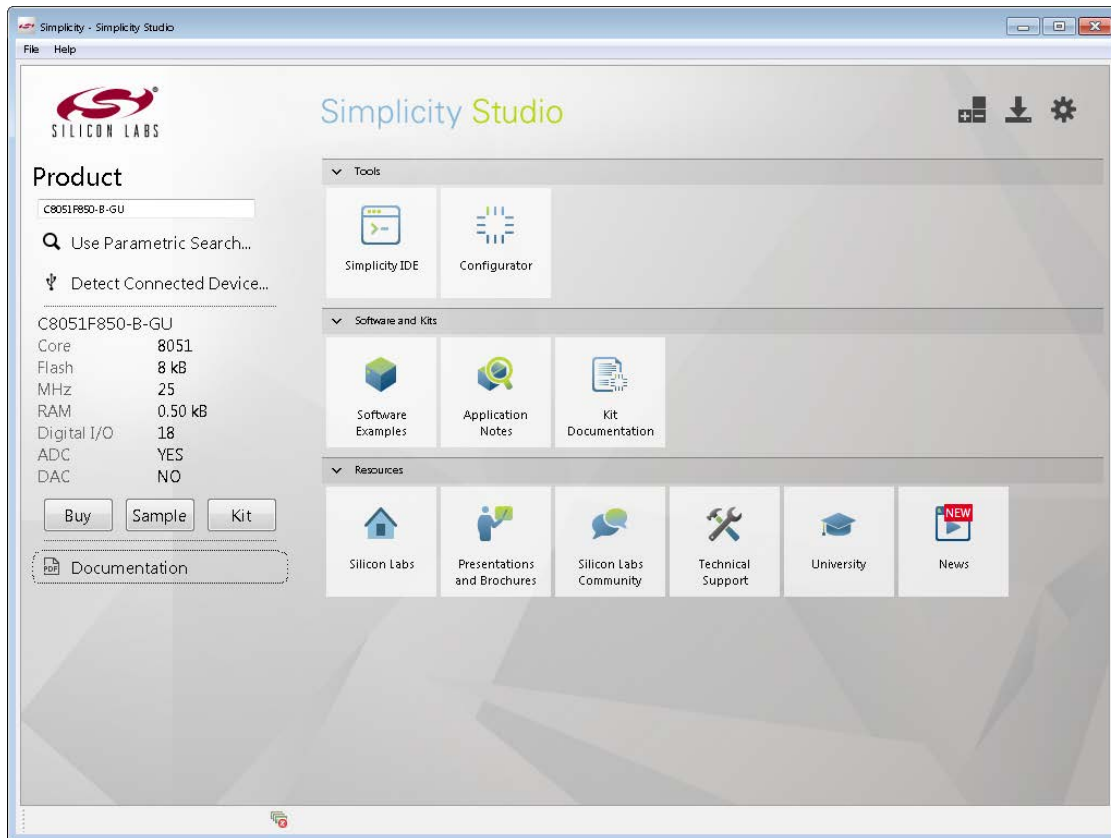


Figure 1. Hardware Setup using a USB Debug Adapter

## 3. Software Setup

Simplicity Studio greatly reduces development time and complexity with Silicon Labs EFM32 and 8051 MCU products by providing a high-powered IDE, tools for hardware configuration, and links to helpful resources, all in one place.

Once Simplicity Studio is installed, the application itself can be used to install additional software and documentation components to aid in the development and evaluation process.



**Figure 2. Simplicity Studio**

The following Simplicity Studio components are required for the C8051F326 Development Kit:

- 8051 Products Part Support
- Simplicity Developer Platform

Download and install Simplicity Studio from [www.silabs.com/8bit-software](http://www.silabs.com/8bit-software) or [www.silabs.com/simplicity-studio](http://www.silabs.com/simplicity-studio). Once installed, run Simplicity Studio by selecting **Start**→**Silicon Labs**→**Simplicity Studio**→**Simplicity Studio** from the start menu or clicking the **Simplicity Studio** shortcut on the desktop. Follow the instructions to install the software and click **Simplicity IDE** to launch the IDE.

The first time the project creation wizard runs, the **Setup Environment** wizard will guide the user through the process of configuring the build tools and SDK selection.

In the **Part Selection** step of the wizard, select from the list of installed parts only the parts to use during development. Choosing parts and families in this step affects the displayed or filtered parts in the later device selection menus. Choose the C8051F326/7 family by checking the **C8051F32x** check box. Modify the part selection at any time by accessing the **Part Management** dialog from the **Window**→**Preferences**→**Simplicity Studio**→**Part Management** menu item.

Simplicity Studio can detect if certain toolchains are not activated. If the **Licensing Helper** is displayed after completing the **Setup Environment** wizard, follow the instructions to activate the toolchain.



## 3.1. Running Blinky

Each project has its own source files, target configuration, SDK configuration, and build configurations such as the **Debug** and **Release** build configurations. The IDE can be used to manage multiple projects in a collection called a workspace. Workspace settings are applied globally to all projects within the workspace. This can include settings such as key bindings, window preferences, and code style and formatting options. Project actions, such as build and debug are context sensitive. For example, the user must select a project in the **Project Explorer** view in order to build that project.

To create a project based on the Blinky example:

1. Click the **Software Examples** tile from the Simplicity Studio home screen.
2. In the **Kit** drop-down, select **C8051F326 Development Kit**, in the **Part** drop-down, select **C8051F326**, and in the **SDK** drop-down, select the desired SDK. Click **Next**.
3. Select **Example** and click **Next**.
4. Under **C8051F326 Development Kit** in the **Blinky** folder, select **F326-7 BlinkyC** and click **Next**, then **Finish**.
5. Click on the project in the **Project Explorer** and click **Build**, the hammer icon in the top bar. Alternatively, go to **Project**→**Build Project**.
6. Click **Debug** to download the project to the hardware and start a debug session.
7. Press the **Resume** button to start the code running. The LED should blink.



8. Press the **Suspend** button to stop the code.



9. Press the **Reset the device** button to reset the target MCU.



10. Press the **Disconnect** button to return to the development perspective.



## 3.2. Simplicity Studio Help

Simplicity Studio includes detailed help information and device documentation within the tool. The help contains descriptions for each dialog window. To view the documentation for a dialog, click the question mark icon in the window:



This will open a pane specific to the dialog with additional details.

The documentation within the tool can also be viewed by going to **Help**→**Help Contents** or **Help**→**Search**.

## 4. Target Board

The C8051F326/7 Development Kit includes a target board with a C8051F326 device pre-installed for evaluation and preliminary software development. Numerous input/output (I/O) connections are provided to facilitate prototyping using the target board. Refer to Figure 3 for the locations of the various I/O connectors.

P1 Power connector (accepts input from 7 to 15 VDC unregulated power adapter)

J1 22-pin Expansion I/O connector

J2 Power Target Board from power adapter at P1

J3 Port I/O Configuration connector

J4 DEBUG connector for Debug Adapter interface

J5 DB-9 connector for UART0 RS232 interface

J7 VIO to VDD connector

J8 USB Debug Adapter target board power connector

J9 USB connector for USB interface

J10 External CMOS oscillator connector

J11 Power Target Board from USB at J9

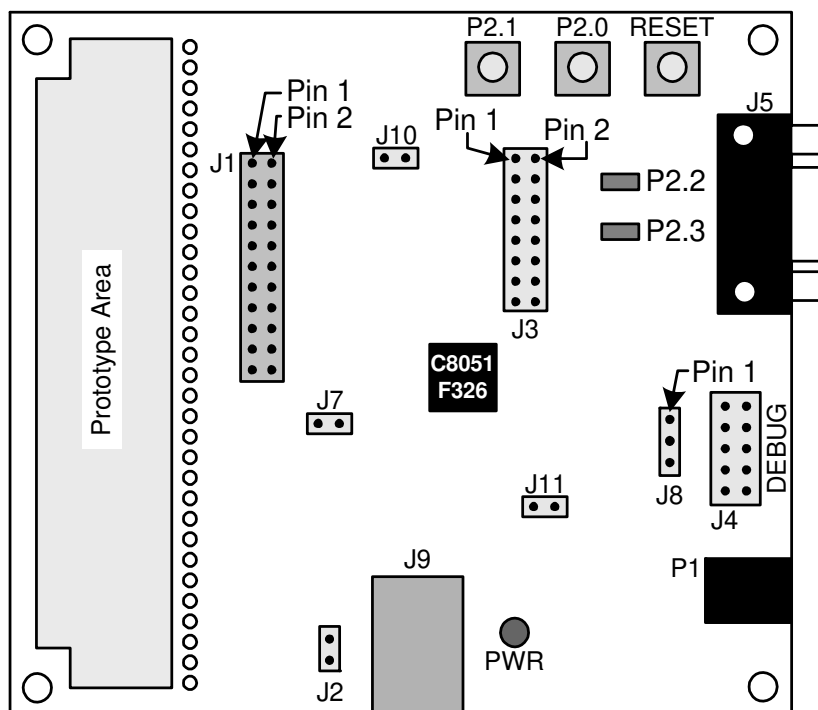


Figure 3. C8051F326 Target Board

## 4.1. System Clock Sources

The C8051F326 device installed on the target board features a calibrated programmable internal oscillator which is enabled as the system clock source on reset. After reset, the internal oscillator operates at a frequency of 1.5 MHz ( $\pm 1.5\%$ ) by default but may be configured by software to operate at other frequencies. Therefore, in many applications an external oscillator is not required. However, if you wish to operate the C8051F326 device at a frequency not available with the internal oscillator, an external CMOS oscillator may be used. Refer to the C8051F326/7 datasheet for more information on configuring the system clock source.

The target board is designed to facilitate the installation of an external CMOS oscillator. Remove shorting block at header J10 and connect the oscillator output to the header. Refer to the C8051F326/7 datasheet for more information on the use of external oscillators.

## 4.2. Switches and LEDs

Three switches are provided on the target board. Switch S1 is connected to the /RST pin of the C8051F326. Pressing S1 puts the device into its hardware-reset state. Switches S2 and S3 are connected to the C8051F326's general purpose I/O (GPIO) pins through headers. Pressing S2 or S3 generates a logic low signal on the port pin. Remove the shorting blocks from the header to disconnect S2 and S3 from the port pins. The port pin signals are also routed to pins on the J1 I/O connector. See Table 1 for the port pins and headers corresponding to each switch.

Three LEDs are also provided on the target board. The red LED labeled PWR LED is used to indicate a power connection to the target board. The green surface mount LEDs labeled with port pin names are connected to the C8051F326's GPIO pins through headers. Remove the shorting blocks from the header to disconnect the LEDs from the port pin. The port pin signals are also routed to pins on the J1 I/O connector. See Table 1 for the port pins and headers corresponding to each LED.

**Table 1. Target Board I/O Descriptions**

Description	I/O	Header
S1	Reset	none
S2	P2.0	J3[1–2]
S3	P2.1	J3[3–4]
Green LED (D4)	P2.2	J3[5–6]
Green LED (D2)	P2.3	J3[7–8]
Red LED	PWR	none

## 4.3. Universal Serial Bus (USB) Interface (J9)

A Universal Serial Bus (USB) connector (J9) is provided to facilitate connections to the USB interface on the C8051F326. Table 2 shows the J9 pin definitions.

**Table 2. J9 USB Connector Pin Descriptions**

Pin #	Description
1	VBUS
2	D–
3	D+
4	GND (Ground)

## 4.4. Expansion I/O Connector (J1)

The 22-pin Expansion I/O connector J1 provides access to all signal pins of the C8051F326 device. Pins for +3 V, and digital ground are also available. A through-hole prototyping area is also provided. Each connection point is labeled indicating the signal available at the connection point. See Table 3 for a list of pin descriptions for J1.

**Table 3. J1 Pin Descriptions**

Pin #	Description	Pin #	Description
1	P0.0	12	P2.3
2	P0.1	13	P2.4
3	P0.2	14	P2.5
4	P0.3	15	P3.0
5	P0.4	16	C2CK/RST
6	P0.5	17	VREGIN
7	P0.6	18	VIO
8	P0.7	19	VBUS
9	P2.0	20	VDD
10	P2.1	21	+3VD
11	P2.2	22	GND

## 4.5. USB Self-powered Configuration

The C8051F326 target board can be powered from three different sources. The sources are the ac/dc adapter (P1), USB connection (J9), and the USB Debug adapter (J4). **Only one power source should be enabled at any time.** See Section 4.8. for information on using the USB Debug Adapter as a power source for the board.

The C8051F326 target board can be configured as a self-powered USB device to take power from the USB cable at J9 instead of the ac/dc adapter connected at P1. To configure the target boards as a self-powered USB device, remove the shorting block from J2 and install on J11. (A shorting block should only be installed on J2 or J11, **never both at the same time.**) Install shorting blocks in the following manner:

J2(ON) & J11(OFF) → Target Board is powered from the ac/dc Adapter (P1).

J2(OFF) & J11(ON) → Target Board is powered from the USB connection (J9)

### Notes:

- When the C8051F326 target board is self-powered from the USB connection (J9), the EC2 Serial Adapter is not powered from the target board. The EC2 Serial Adapter must be powered directly by connecting the ac/dc adapter to the Serial Adapter's dc power jack.
- The RS232 Serial Interface (J5) cannot be used when powering the target board from the USB connection (J9).

## 4.6. Target Board DEBUG Interface (J4)

The DEBUG connector (J4) provides access to the DEBUG (C2) pins of the C8051F326. It is used to connect the Serial Adapter or the USB Debug Adapter to the target board for in-circuit debugging and Flash programming. Table 4 shows the DEBUG pin definitions.

**Table 4. DEBUG Connector Pin Descriptions**

Pin #	Description
1	+3 VD (+3.3 VDC)
2, 3, 9	GND (Ground)
4	C2D
5	/RST (Reset)
6	P3.0
7	C2CK
8	Not Connected
10	USB Power

## 4.7. Serial Interface (J5)

A RS232 transceiver circuit and DB-9 (J5) connector are provided on the target board to facilitate serial connections to UART0 of the C8051F326. The TX, RX, RTS and CTS signals of UART0 may be connected to the DB-9 connector and transceiver by installing shorting blocks on header J3.

J3[9–10]- Install shorting block to connect UART0 TX (P0.4) to the transceiver.

J3[11–12]- Install shorting block to connect UART0 RX (P0.5) to the transceiver.

J3[13–14]- Install shorting block to connect UART0 RTS (P2.4) to the transceiver.

J3[15–16]- Install shorting block to connect UART0 CTS (P2.5) to the transceiver.

## 4.8. USB Debug Adapter Target Board Power Connector (J8)

The USB Debug Adapter includes a connection to provide power to the target board. This connection is routed from J4[10] to J8[1]. Place a shorting block at header J8[2-3] to power the board directly from an ac/dc power adapter. Place a shorting block at header J8[1–2] to power the board from the USB Debug Adapter. Please note that the second option is not supported with either the EC1 or EC2 Serial Adapters.



## 5. Schematics

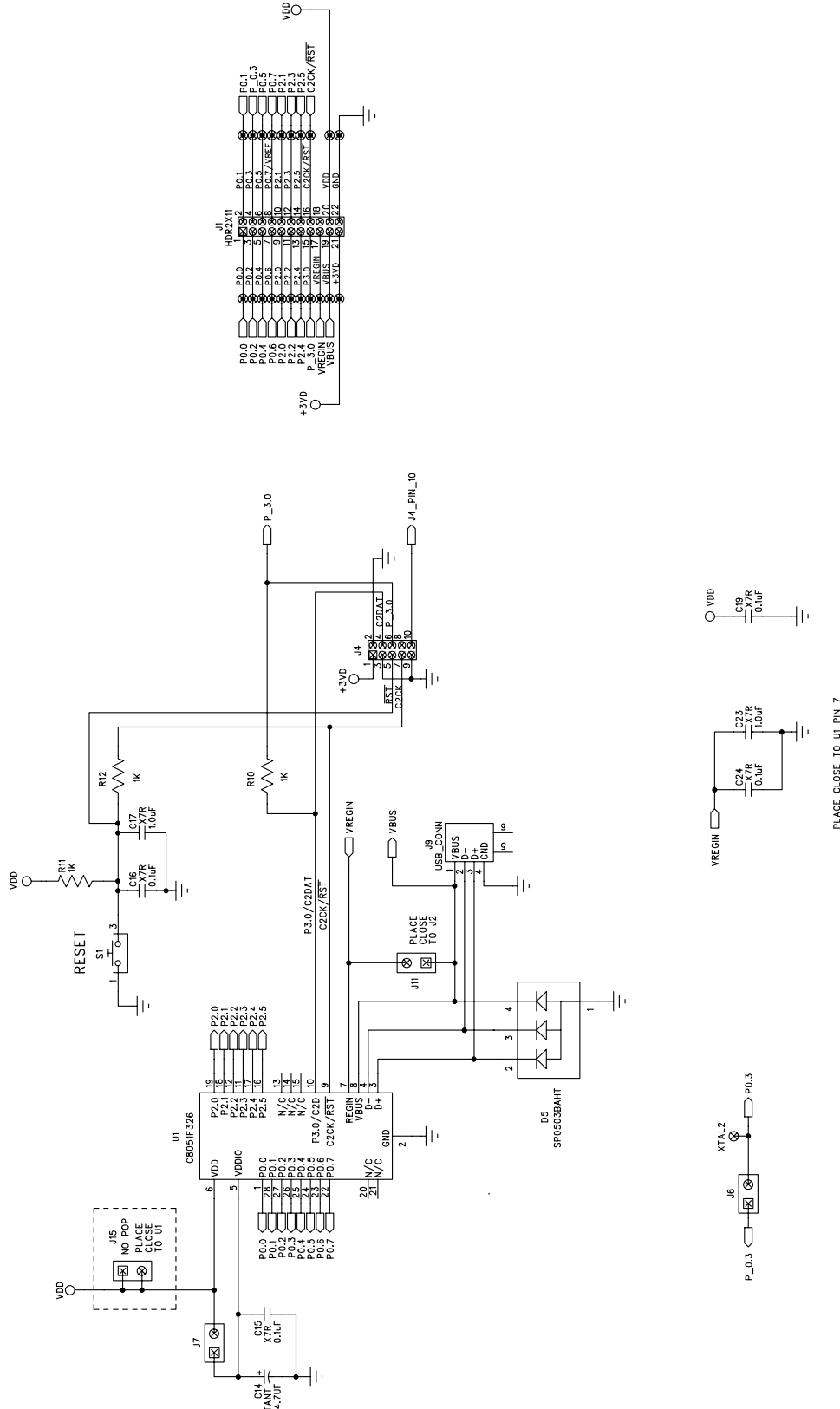


Figure 4. C8051F326 Target Board Schematic (Page 1)

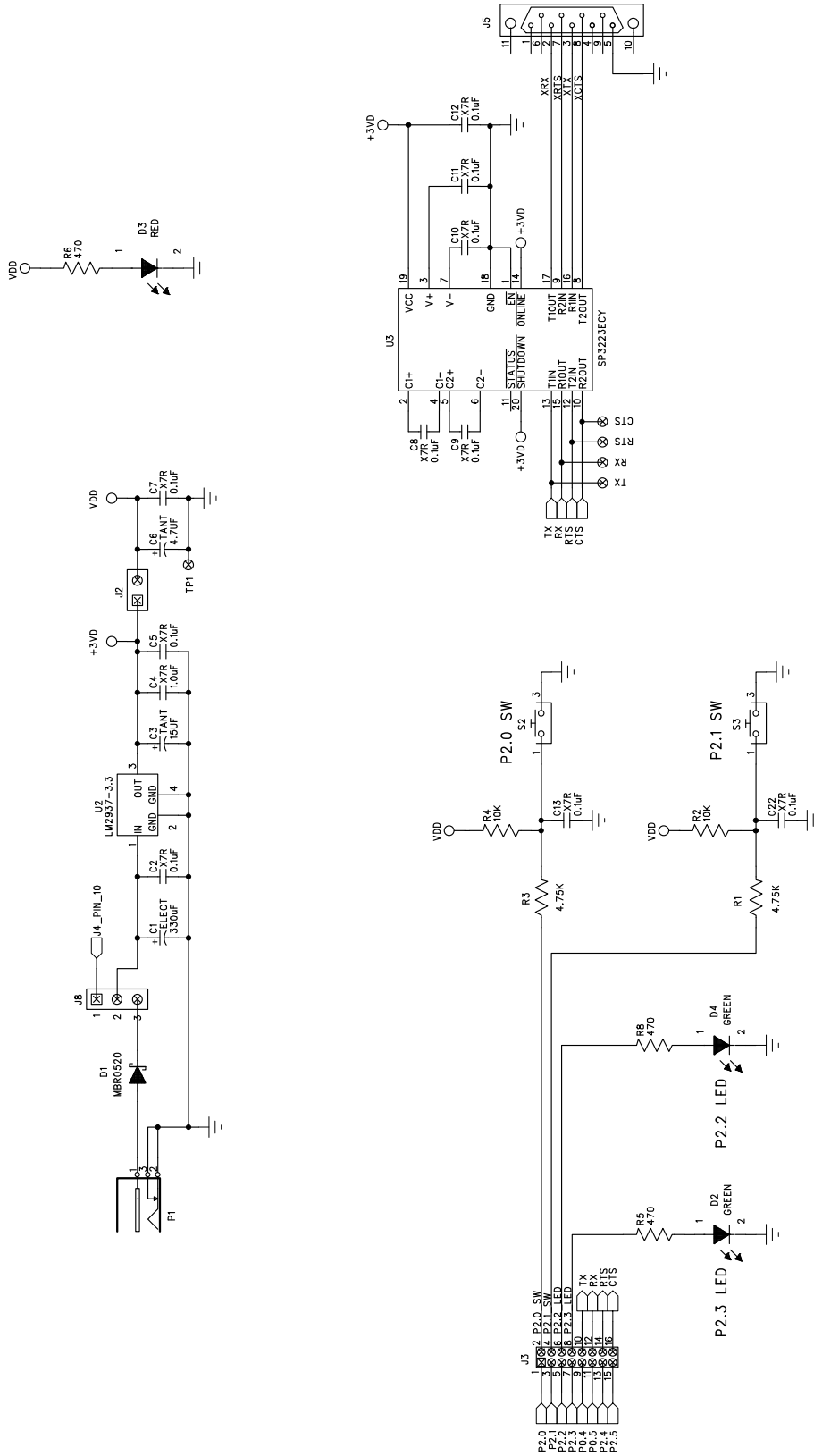


Figure 5. C8051F326 Target Board Schematic (Page 2)

## DOCUMENT CHANGE LIST

### Revision 0.1 to Revision 0.2

- Removed EC2 Serial Adapter from Kit Contents.
- Removed Section 2. Hardware Setup using an EC2 Serial Adapter. See RS232 Serial Adapter (EC2) User's Guide.
- Removed Section 8. EC2 Serial Adapter. See RS232 Serial Adapter (EC2) User's Guide.
- Removed Section 9. USB Debug Adapter. See USB Debug Adapter User's Guide.

### Revision 0.2 to Revision 0.3

- Updated "Software Setup," on page 2.



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