BUF08832EVM User Guide and Software Tutorial

This user's guide describes the characteristics, operation, and use of the BUF08832EVM evaluation board. It discusses how to set up and configure the software and hardware, and reviews various aspects of the program operation. Throughout this document, the terms *evaluation board*, *evaluation module*, and *EVM* are synonymous with the BUF08832EVM. This user's guide also includes information regarding operating procedures and input/output connections, an electrical schematic, and a parts list for the EVM.

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1 Overview

The BUF08832 is a programmable gamma-voltage generator and V_{COM} calibrator. This device offers eight programmable gamma channels and one programmable V_{COM} channel, making it ideal for 10-bit source TFT-LCD reference drivers. The BUF08832EVM is a platform for evaluating the performance of the BUF08832 under various signal, reference, and supply conditions. This document gives a general overview of the BUF08832EVM, and provides a general description of the features and functions to be considered while using this evaluation module.

1.1 BUF08832EVM Kit Contents

Figure 1 illustrates the hardware included with the BUF08832EVM kit. Contact the Texas Instruments Product Information Center nearest you if any component is missing. It is highly recommended that you check the TI web site at http://www.ti.com to verify that you have the latest versions of the related software.

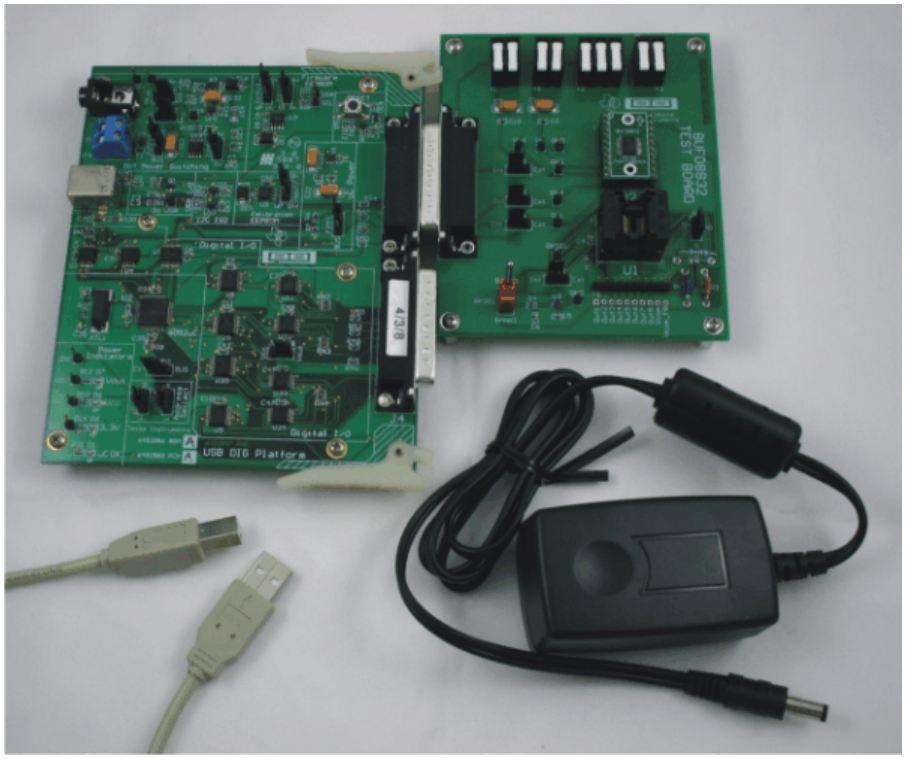

Figure 1. Hardware Included with the BUF08832EVM Kit

The complete kit includes the following items:

- BUF08832_Test_Board PCB
- USB DIG Platform PCB
- USB cable
- +6V power supply
- CD-ROM that contains this user's guide, product software, and related documentation

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1.2 Related Documentation from Texas Instruments

The following documents provide information regarding Texas Instruments' integrated circuits used in the assembly of the BUF08832EVM. This user's guide is available from the TI web site under literature number ***SBOU081***. Any letter appended to the literature number corresponds to the document revision that is current at the time of the writing of this document. Newer revisions may be available from the TI web site, or call the Texas Instruments' Literature Response Center at (800) 477-8924 or the Product Information Center at (972) 644- 5580. When ordering, identify the document by both title and literature number.

Related Documentation

Document	Literature Number
BUF08832 Product Data Sheet	SBOS476
USB DIG Platform Users Guide	SBOU058

2 BUF08832EVM Hardware Setup

Figure 2 shows the system setup for the BUF08832EVM. The PC runs software that communicates with the USB DIG Platform. The USB DIG Platform generates the analog and digital signals used to communicate with the BUF08832_Test_Board. Connectors on the BUF08832_Test_Board allow the user to connect to the device under test (DUT), in order to monitor the power, current, and voltage of the BUF08832 DUT.

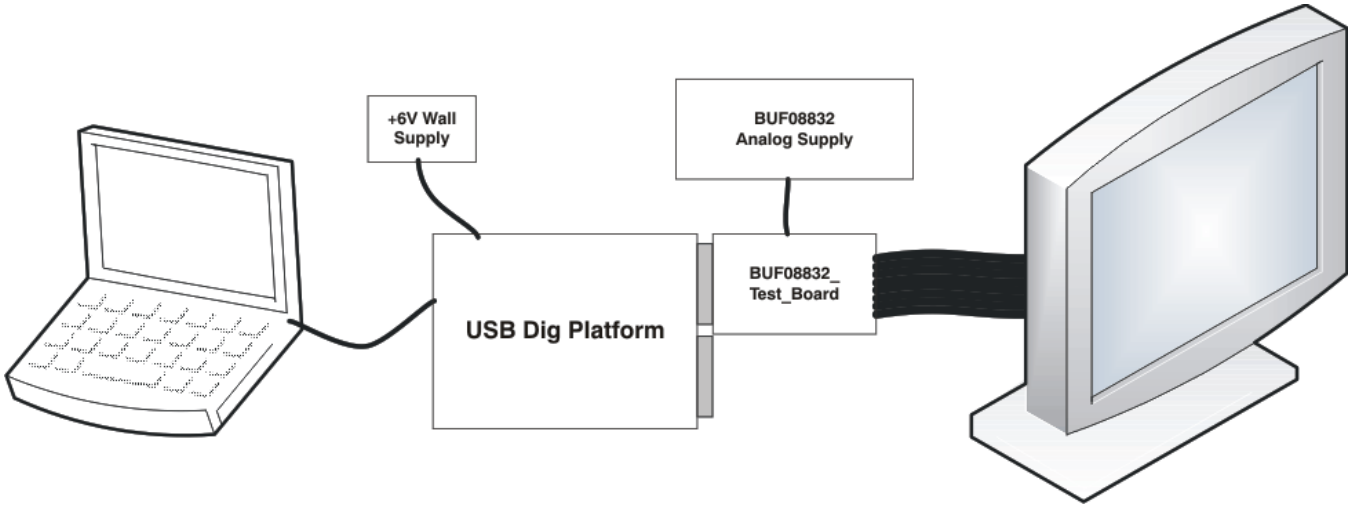

Figure 2. BUF08832EVM Hardware Setup

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2.1 Theory of Operation for BUF08832_Test_Board Hardware

Figure 3 presents a block diagram of the BUF08832_Test_Board. The functionality of this PCB is relatively simple. It provides connections to the I²C™ interface and general-purpose input/outputs (GPIO) on the USB DIG Platform board. It also provides connection points for external connections of the shunt voltage, bus voltage, and GND.

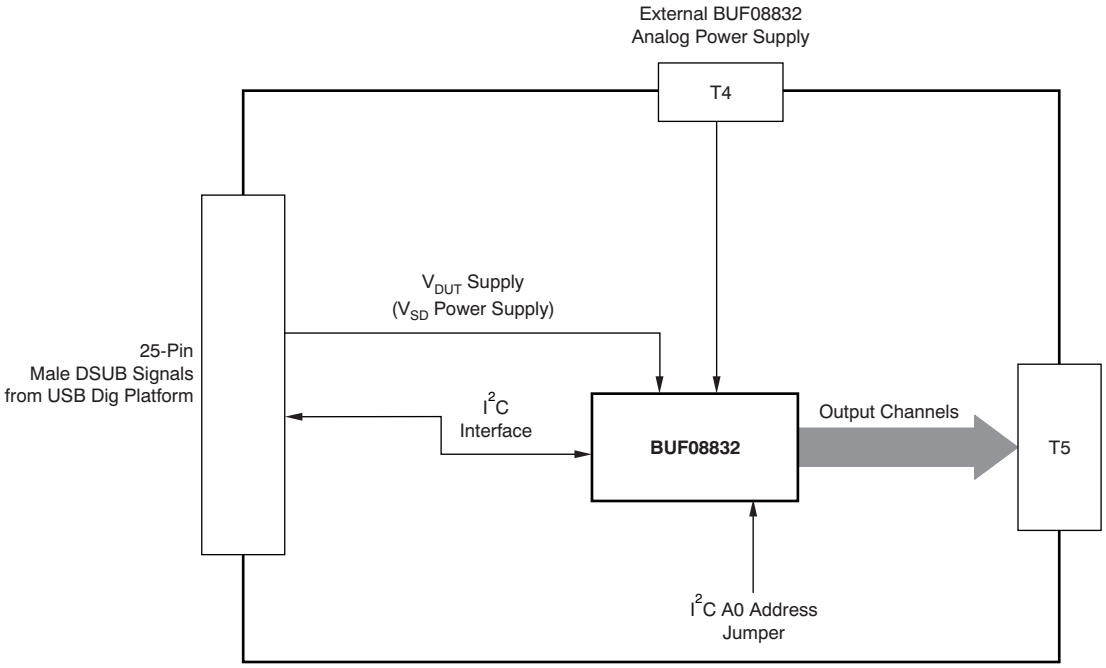

Figure 3. BUF08832_Test_Board Block Diagram

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2.2 Signal Definitions of J1 (25-Pin Male DSUB)

Table 1 lists the different signals connected to J1 on the BUF08832_Test_Board. Table 1 also identifies signals connected to pins on J1 that are not used on the BUF08832_Test_Board.

Table 1. Signal Definition of J1 (25-Pin Male DSUB) on BUF08832_Test_Board

PIN On J1	Signal	BUF08832 Pin
1	NC	No connection
2	NC	No connection
3	NC	No connection
4	NC	No connection
5	NC	No connection
6	NC	No connection
7	NC	No connection
8	NC	No connection
9	I^2C_SCK	No connection
10	I^2C_SDA2	No connection
11	NC	No connection
12	I^2C_SCK_ISO	I^2C clock signal (SCL) channel 1; can be disconnected using a switch
13	I^2C_SDA_ISO	I^2C data signal (SDA) channel 1; can be disconnected using a switch
14	NC	No connection
15	NC	No connection
16	NC	No connection
17	V_{DUT}	Switched 3V or 5V power. Note that when power is switched off, the digital I/O is also switched off.
18	V_{CC}	No connection
19	NC	No connection
20	NC	No connection
21	GND	Common or ground connection for power.
22	SPI_SCK	No connection
23	SPI_CS1	No connection
24	SPI_DOUT	No connection
25	SPI_DIN1	No connection

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2.3 Theory of Operation for USB_DIG_Platform

Figure 4 shows the block diagram for the USB DIG Platform. This platform is a general-purpose data acquisition system that is used on several different Texas Instruments evaluation modules. The details of its operation are included in a separate document, SBOU058 (available for download at www.ti.com). The block diagram shown in Figure 4 gives a brief overview of the platform. The primary control device on the USB DIG Platform is the TUSB3210.

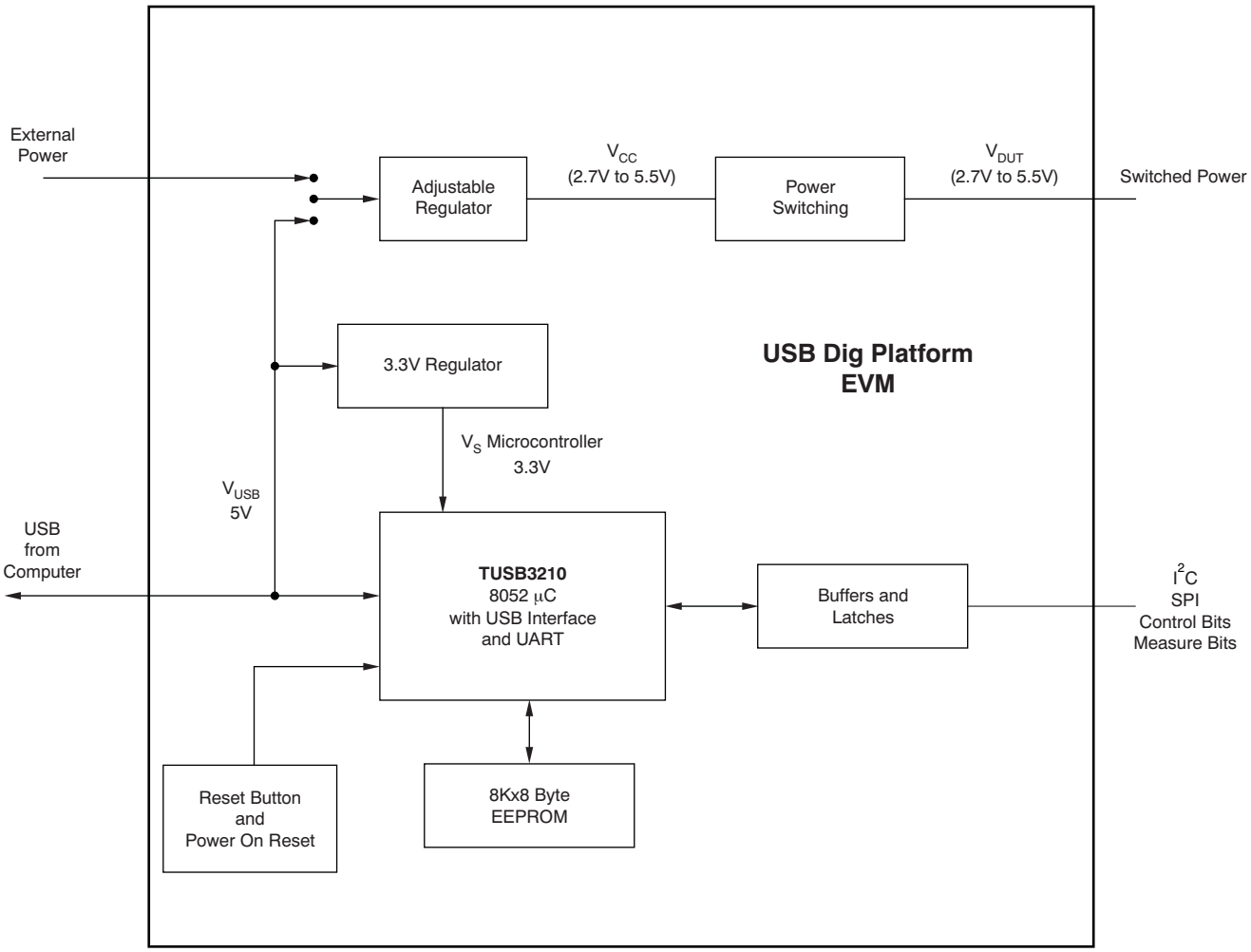

Figure 4. USB_DIG_Platform Theory of Operation

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3 BUF08832EVM Hardware Overview

The BUF08832EVM hardware overview involves connecting the two PCBs of the EVM together, applying power, connecting the USB cable, and setting the jumpers. This section presents the details of this procedure.

3.1 Electrostatic Discharge Warning

CAUTION

Many of the components on the BUF08832EVM are susceptible to damage by electrostatic discharge (ESD). Customers are advised to observe proper ESD handling precautions when unpacking and handling the EVM, including the use of a grounded wrist strap at an approved ESD workstation.

3.2 Typical Hardware Connections

To set up the BUF08832EVM hardware, connect the two PCBs of the EVM together, and apply a power source to the BUF08832 Test Board. The external connections may be the real-world system that the BUF08832 will be incorporated into. Figure 5 illustrates the typical hardware connections.

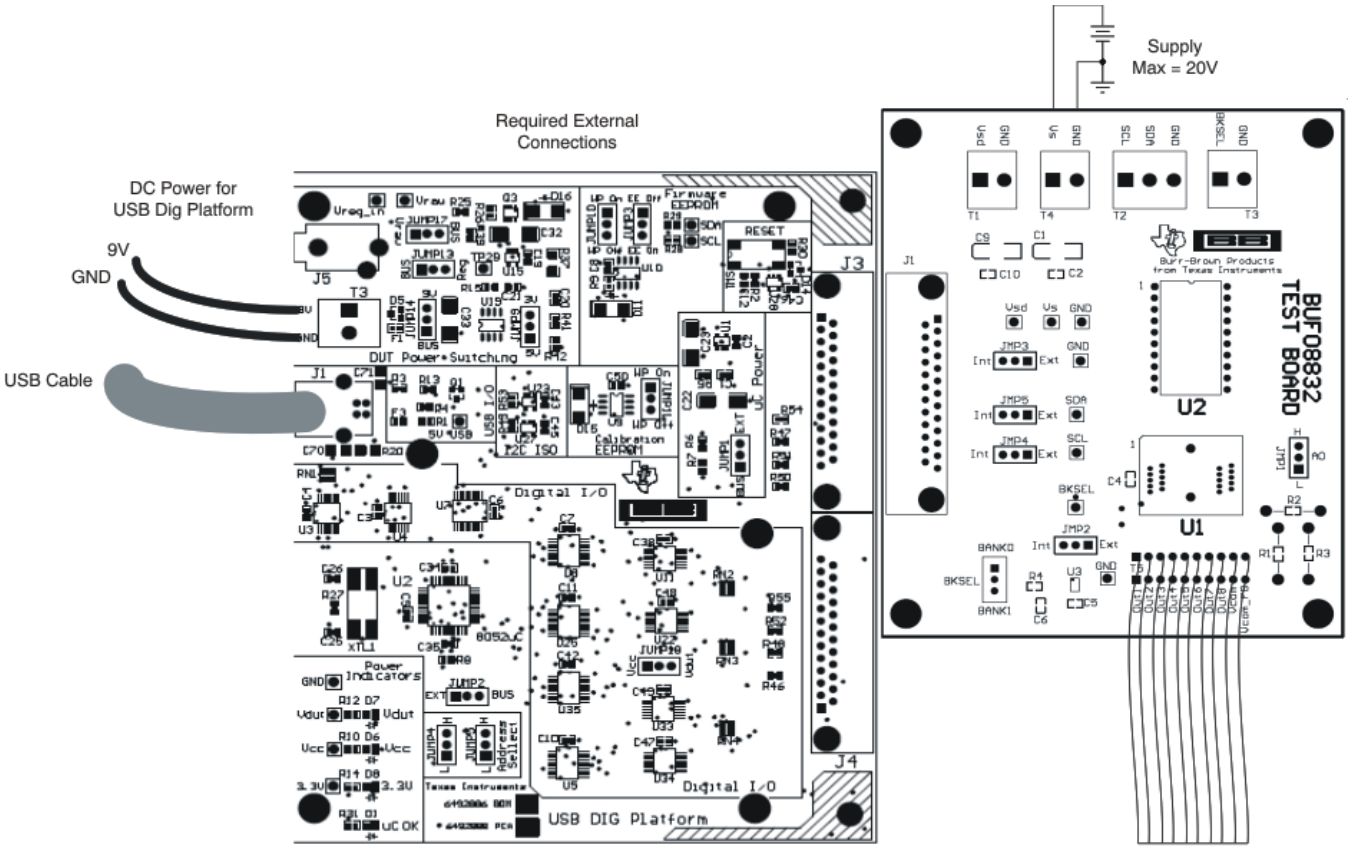

Figure 5. Typical Hardware Connections

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3.3 Connecting the Hardware

To connect the two PCBs of the BUF08832EVM together, gently push on both sides of the DSUB connectors (as shown in Figure 6). Make sure that the two connectors are completely pushed together; loose connections may cause intermittent operation.

3.4 Connecting Power

After the two parts of the BUF08832EVM are connected, as Figure 6 shows, connect the power to the EVM. Always connect power before connecting the USB cable. If you connect the USB cable before connecting the power, the computer will attempt to communicate with an unpowered device that will not be able to respond.

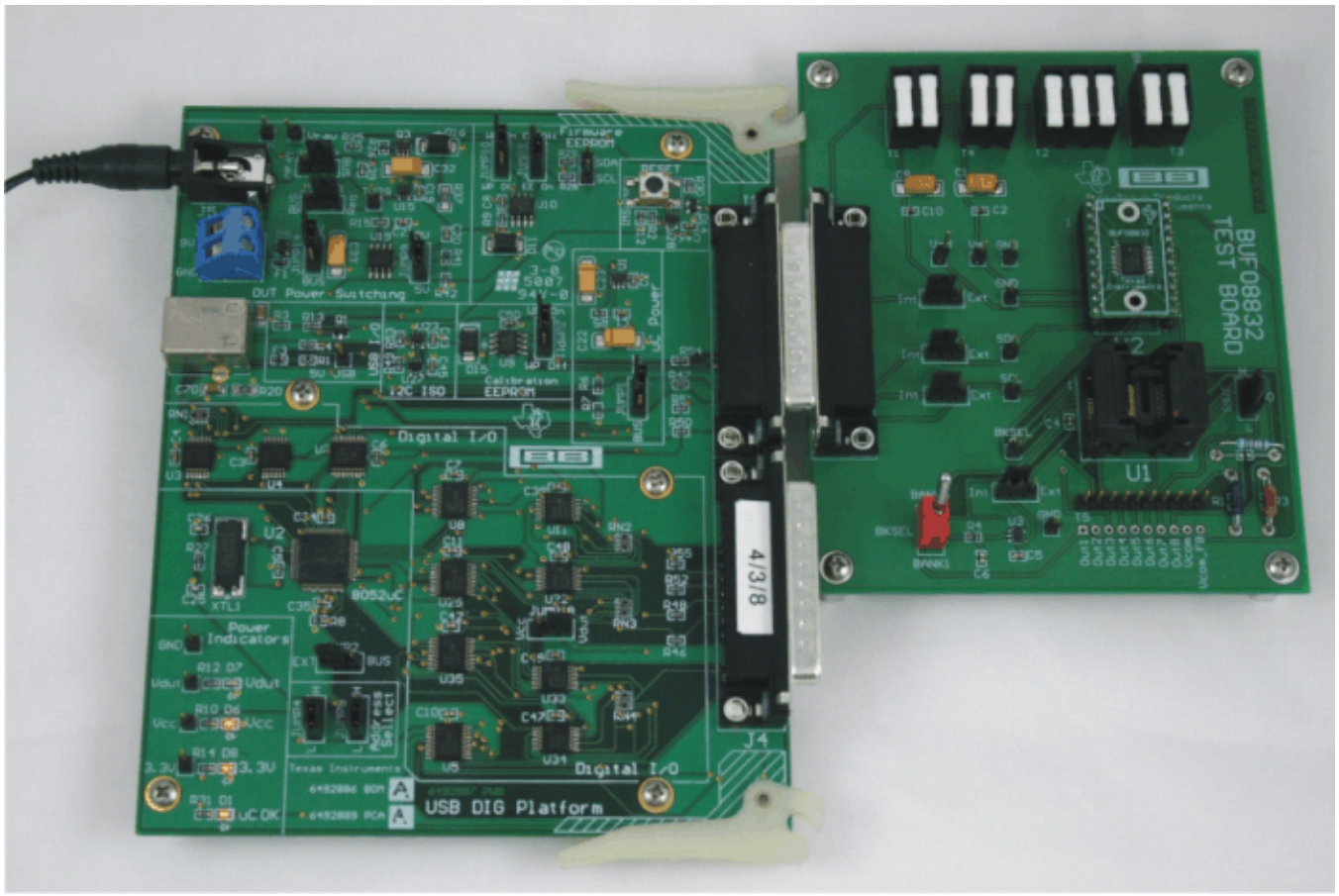

Figure 6. Connecting Power to the EVM

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3.5 Connecting the USB Cable to the BUF08832EVM

Figure 7 shows the typical response to connecting the USB DIG Platform board to a PC USB port for the first time. Note that the EVM must be powered on before connecting the USB cable. Typically, the computer will respond with a *Found New Hardware, USB Device* pop-up dialog. The pop-up window typically changes to *Found New Hardware, USB Human Interface Device*. This pop-up indicates that the device is ready to be used. The USB DIG Platform uses the human interface device drivers that are part of the Microsoft® Windows® operating system.

In some cases, the Windows *Add Hardware Wizard* will pop up. If this prompt occurs, allow the system device manager to install the human interface drivers by clicking **Yes** when requested to install drivers.

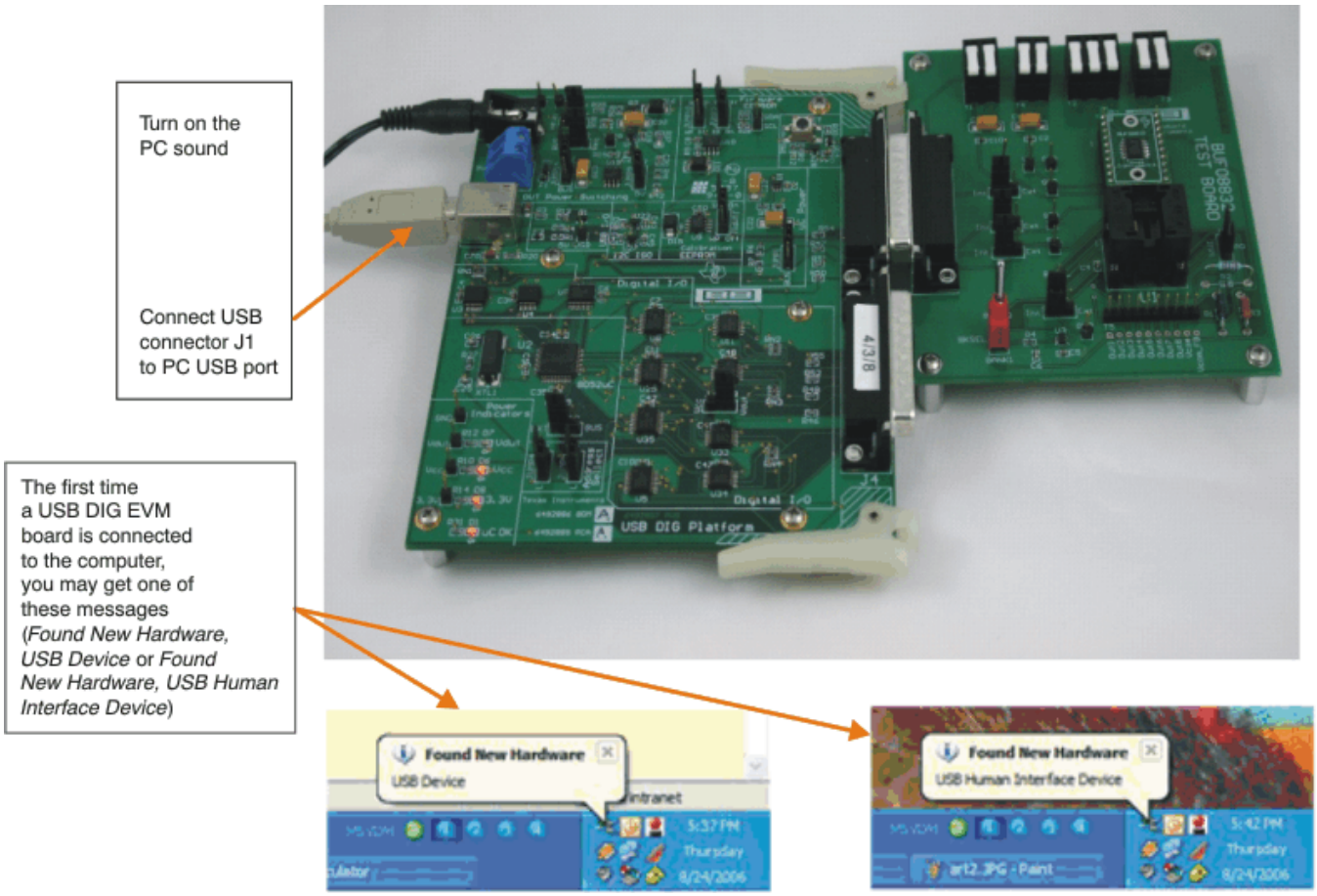

Figure 7. Connecting the USB Cable

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3.6 BUF08832EVM Default Jumper Settings

Figure 8 shows the default jumpers configuration for the BUF08832EVM. In general, the jumper settings of the USB DIG Platform will not need to be changed. You may want to change some of the jumpers on the BUF08832_Test_Board to match your specific configuration. For instance, you may wish to set a specific I^2C address on the DUT.

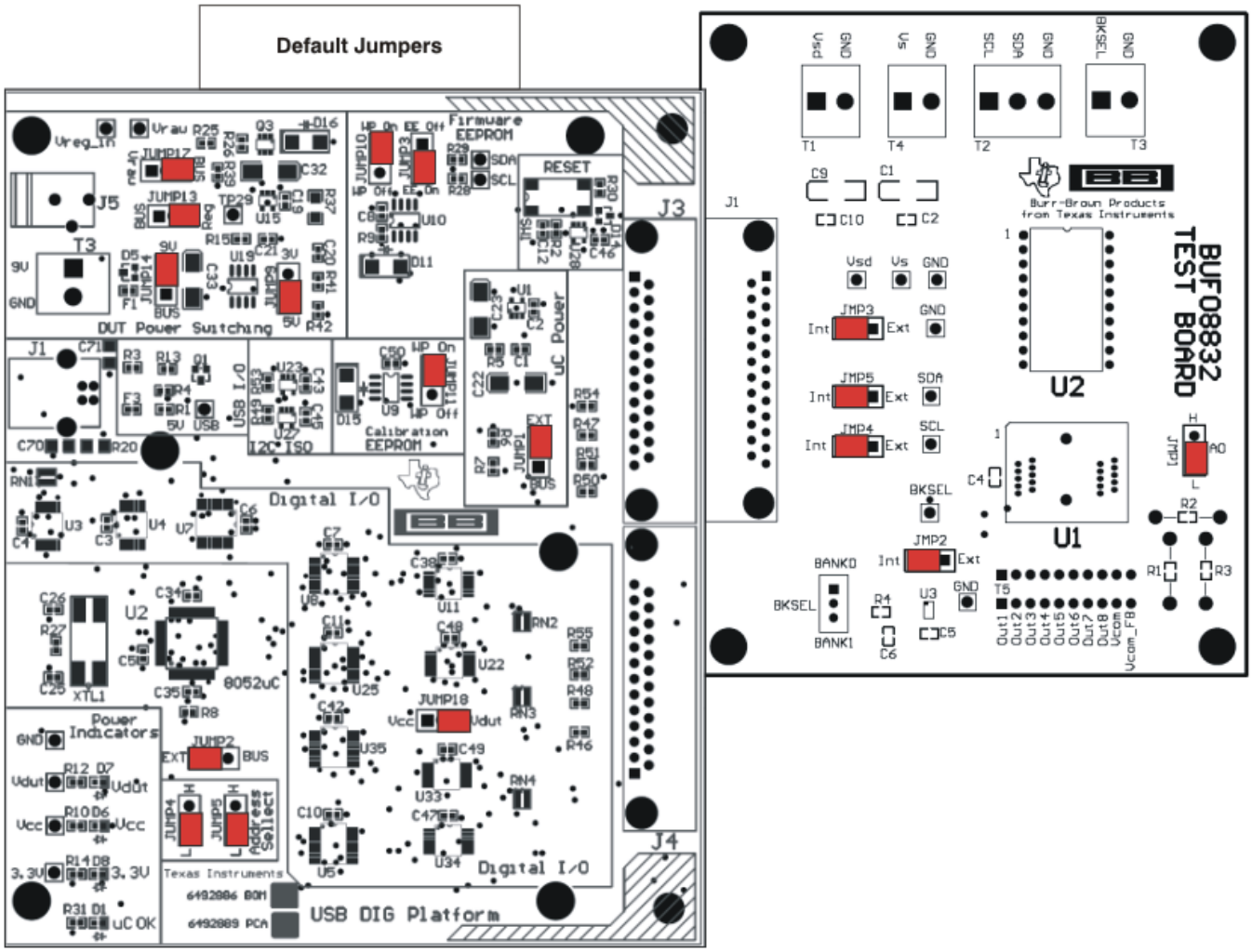

Figure 8. BUF08832EVM Default Jumper Settings

Jumpers 2 through 5 on the BUF08832_Test_Board are all typically set to the same position. When set to the INT position, the signals for digital supply, bank select and the digital communication lines are generated and controlled from the USB_DIG_Platform or by the onboard bank select switch. When these jumpers are set to the EXT position, the previously described signals connect to the terminal strips T1, T2, and T3. Jumper 1 controls the I^2C address pin for the BUF08832. This jumper can set the address for A0 to either high or low.

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Table 2 summarizes the function of the BUF08832_Test_Board jumpers. For most applications, Jumpers 2 through 5 are all set to either the INT or the EXT position.

Table 2. BUF08832_Test_Board Jumper Functions

Jumper	Default	Purpose
JMP1	L	This jumper selects I^2C AO address selection. Two separate I^2C addresses can be selected, depending on whether JMP1 is set to high or low.
JMP2	INT	This jumper selects whether the BKSEL pin on the BUF08832 is controlled by the manual switch located on the BUF08832_Test_Board or whether the BKSEL can be controlled by an external source connected to terminal T3. The default INT position allows the BKSEL pin to be controlled by the manual switch.
JMP3	INT	This jumper selects whether the VSD pin on the BUF08832 is connected to the VDUT signal generated from the USB_DIG_Platform or whether digital supply pin is connected to terminal T1, allowing for an external supply to power the digital circuitry. The default INT position connects the VSD pin to the VDUT control signal.
JMP4,	INT	This jumper selects whether the SCL pin on the BUF08832 is connected to the I^2C_SCK_ISO signal generated from the USB_DIG_Platform or whether the SCL pin is connected to terminal T2 allowing for an external source to control the I^2C clock line. The default INT position connects the SCL pin to the I^2C_SCK_ISO control signal.
JMP5	INT	This jumper selects whether the SDA pin on the BUF08832 is connected to the I^2C_SDA_ISO signal generated from the USB_DIG_Platform or whether the SDA pin is connected to terminal T2 allowing for an external source to control the I^2C data line. The default INT position connects the SDA pin to the I^2C_SDA_ISO control signal.

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Table 3 summarizes the function of the USB DIG Platform jumpers. For most applications, the default jumper position should be used. A separate document (SBOU058) gives details regarding the operation and design of the USB DIG Platform.

Table 3. USB_DIG_Platform Jumper Functions

Jumper	Default	Purpose
JUMP1	EXT	This jumper selects external power or bus power. External power is applied on J5 or T3 (9V dc). Bus power is 5V from the USB bus. External power is typically used because the USB Bus power is noisy.
JUMP2	EXT	Same as JUMP1.
JUMP3	EE ON	This jumper determines where the TUSB3210 will load the USB DIG Platform firmware upon power-up or reset. The *EE Off* position is used for development for development or firmware update.
JUMP4, JUMP5	L, L	This jumper sets the address for the USB board. The only reason to change from the default setting is if multiple boards are being used.
JUMP9	5V	This jumper selects the voltage of the device under test supply (V_{DUT} = 5V or 3V). This jumper is typically the only jumper that is changed for most applications.
JUMP10	WP ON	This write protects the firmware EEPROM.
JUMP11	WP ON	This write protects the calibration EEPROM
JUMP13	REG	Uses the regulator output to generate the V_{DUT} supply. The USB bus can be used as the V_{DUT} supply.
JUMP14	9V	Uses the external power (9V as opposed to the bus)
JUMP17	BUS	While in the BUS position V_{DUT} operation is normal. While in the Vraw position the V_{DUT} supply is connected to an external source. This configuration allows for any value of V_{DUT} between 3V and 5V.(1)
JUMP18	V_{DUT}	Connects the pull-up on GPIO to the V_{DUT} supply or the V_{CC} supply.

(1) **CAUTION:** Adjusting outside of this range will damage the EVM.

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3.7 BUF08832_Test_Board Features

This section describes some of the hardware features present on the BUF08832_Test_Board.

3.7.1 JMP1: I²C Address Hardware Setting

Jumper JMP1 is used to set the hardware setting for the A0 I²C address pin on the BUF08832. Using JMP1, the A0 address can be set to either a logic '1' or a logic '0' to allow for two unique I²C addresses. See Section 5.2.1 for more details about how to configure the BUF08832EVM software to match the JMP1 hardware setting.

3.7.2 BKSEL: OTP Bank Selection

The BKSEL switch (illustrated in Figure 9) located on the BUF08832_Test_Board selects the memory bank to be used when operating the EVM. Bank 0 selects the gamma curve that is stored in Bank_0 of the BUF08832. Bank 1 selects the gamma curve that is stored in Bank_1 of the BUF08832.

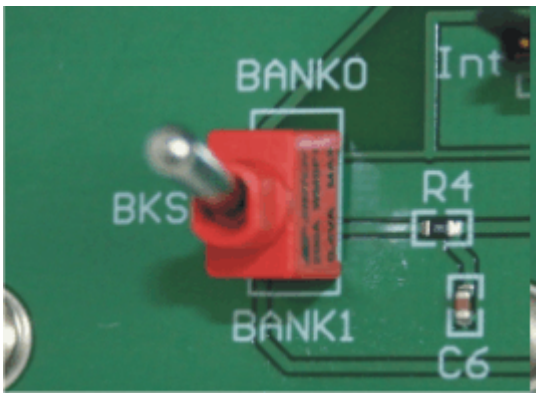

Figure 9. BKSEL Switch

3.7.3 JMP2: BKSEL Control Setting

Jumper JMP2 determines how the OTP memory bank selection is controlled. There are two settings JMP2 can be set to. Position INT specifies that control of the BKSEL pin is handled on the BUF08832EVM. For this jumper setting, the BKSEL switch controls whether Bank 0 or Bank 1 OTP is selected.

The EXT position for JMP2 allows for an external control signal connected to terminal T3 to determine the selection of which OTP bank to be used.

3.7.4 JMP3: VSD Control Setting

Jumper JMP3 selects where the BUF08832 digital supply pin is connected. If JMP3 is set in the INT position, the V_{SD} pin is connected to the switchable V_{DUT} signal generated from the USB_DIG_Platform. This voltage can be set to either 3.3V or 5V depending on how JUMP9 on the USB_DIG_Platform is set. While JMP3 is set to the INT position, the V_{SD} Power button on the BUF08832 software is able to control whether the V_{DUT} supply voltage is turned on or off.

When JMP3 is set in the EXT position, an external supply connected to terminal T1 can be used to provide the digital supply voltage for the BUF08832.

3.7.5 JMP4: I²C SCK Control Setting

Jumper JMP4 selects where the BUF08832 I²C SCL pin is connected. If JMP4 is set in the INT position, the I²C clock signal is generated from the I²C_SCK_ISO signal from the USB_DIG_Platform.

When JMP4 is set in the EXT position, an external source connected to SCL pin of terminal T2 can be used to provide the I²C SCK signal for the BUF08832.

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3.7.6 JMP5: I²C SDA Control Setting

Jumper JMP5 selects where the BUF08832 I²C SDA pin is connected. If JMP5 is set in the INT position, the I²C data signal is generated from the I²C_SDA_ISO signal from the USB_DIG_Platform.

When JMP4 is set in the EXT position, an external source connected to SDA pin of terminal T2 can be used to provide the I²C SDA signal for the BUF08832.

3.7.7 BUF08832 Device Placement

The BUF08832_Test_Board allows the user two separate locations on the board where the BUF08832 test device can be installed. The U1 location on the BUF08832_Test_Board is a ZIF socket that allows the user to evaluate and program many devices very quickly. One drawback to this socket is that there is no connection to the PowerPAD™ thermal pad of the BUF08832. Because of this drawback, while in this socket, the BUF08832 cannot be operated to its full output capability as a result of thermal dissipation limitations.

The U2 location allows for a BUF08832 device that is soldered down on a DIP adaptor board to be installed on the BUF08832_Test_Board. The output capability of the BUF08832 that is soldered to this adaptor board can be fully evaluated. The thermal pad of this soldered BUF08832 is connected correctly allowing the device to dissipate the necessary power while being evaluated. One populated BUF00832 DIP adaptor board is provided with the EVM.

CAUTION

Only one location should be populated at a time. The use of both locations simultaneously will likely damage one or both of the devices being tested.

3.7.8 Terminal Strip T5

Terminal strip T5 provides the individual channel output signals on a single row of headers as well as a row of vias. This footprint provides the user with multiple options on how to interface the output signals of the BUF08832 with the appropriate display panel or evaluation system. Users can develop a custom cable to connect the headers directly to their panels or solder directly to the individual vias.

4 BUF08832EVM Software Setup

This section discusses how to install the BUF08832 software.

4.1 Operating Systems for BUF08832 Software

The BUF08832EVM software has been tested on the Microsoft Windows XP operating system (OS) with United States and European regional settings. The software should also function on other Windows operating systems.

4.2 BUF08832EVM Software Installation

The BUF08832EVM software is included on the CD that is shipped with the EVM kit. It is also available through the BUF08832EVM product folder on the TI web site. To download the software to your system, insert the disc into an available CD-ROM drive. Navigate to the drive contents and open the BUF08832EVM software folder. Locate the compressed file (*BUF08832EVM.zip*) and open it. Using WinZIP® or a similar file compression program, extract the BUF08832EVM files into a specific BUF08832 folder (for example, *C:\BUF08832*) on your hard drive.

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Once the files are extracted, navigate to the BUF08832 folder that you created on your hard drive. Locate the *setup.exe* file; then click the file to start the installation process, as shown in Figure 10.

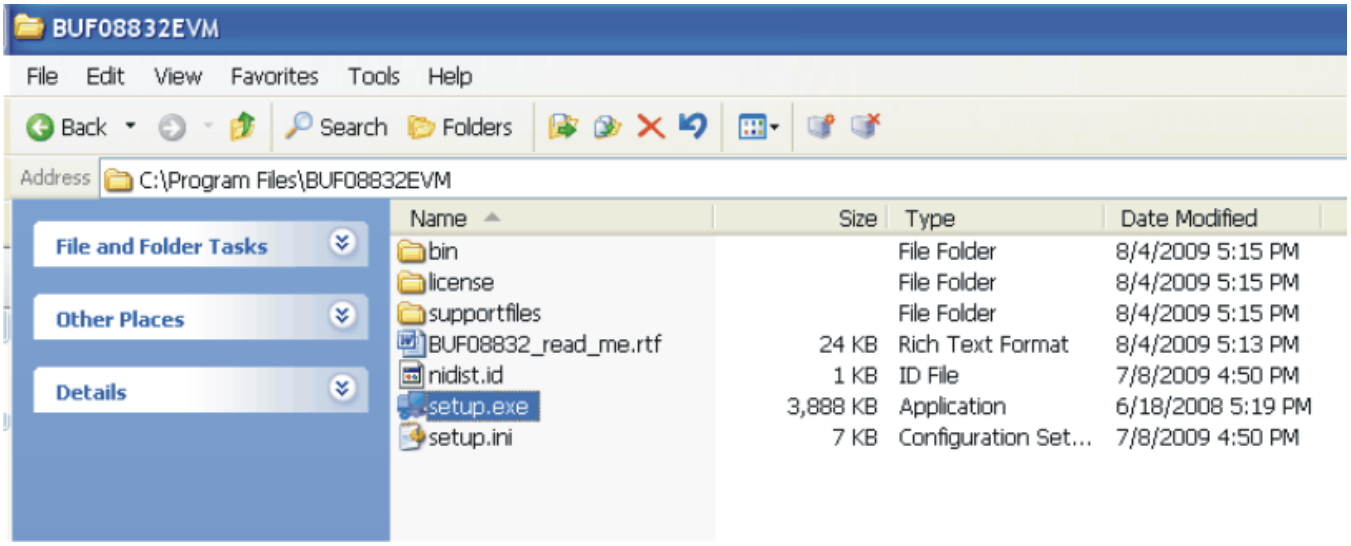

Figure 10. BUF08832EVM Software Installation

The BUF08832 software installer file then opens to begin the installation process, as Figure 11 shows.

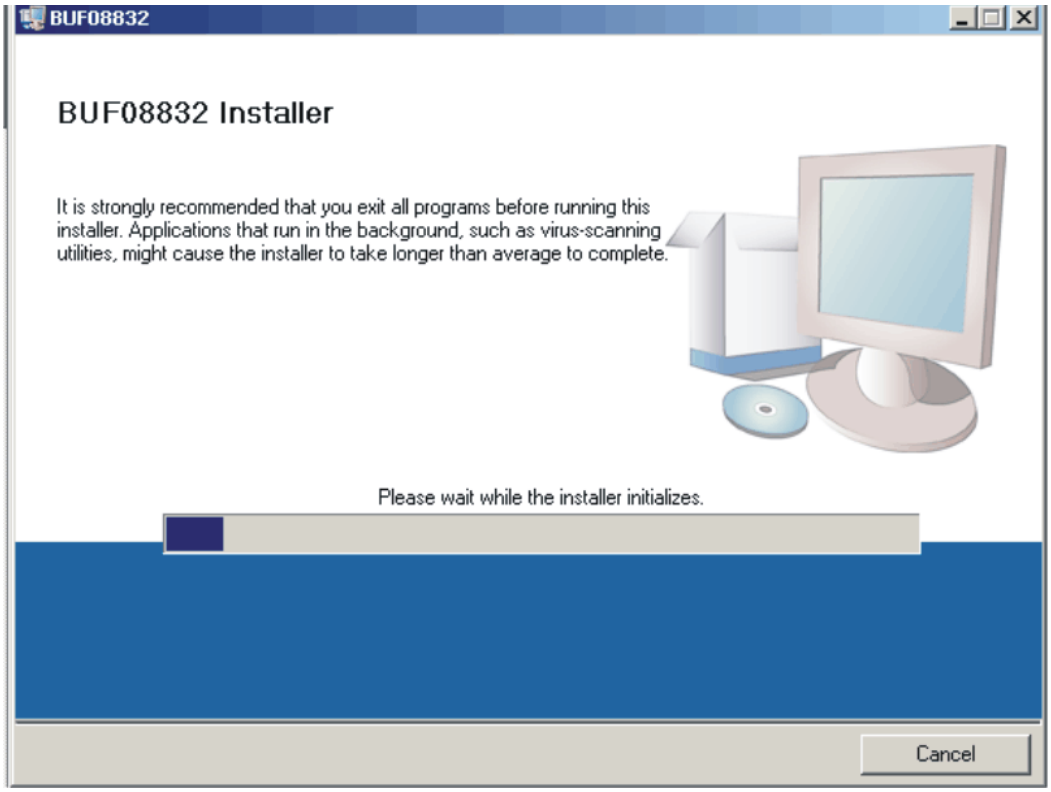

Figure 11. BUF08832EVM Software Install Window

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After the installer has begun, the user is given the choice of where to install the program on the PC. Following this option, two license agreements are presented that must be accepted. After accepting the Texas Instruments and National Instruments license agreements, the progress bar opens and shows the installation of the software. At the completion of the software installation, a *Read Me* file opens, showing the hardware that is provided with the BUF08832EVM kit. Click the **Finish** button to complete the installation procedure.

4.3 Software Description and Set-Up

The BUF08832EVM software allows the user to read and write to all registers in the BUF08832 gamma correction buffer. Furthermore, it allows programming of the OTP register on the BUF08832. The software also permits the user to select either I^2C address. Press the **About** button as shown in Figure 12 to verify that you have the latest version of the software.

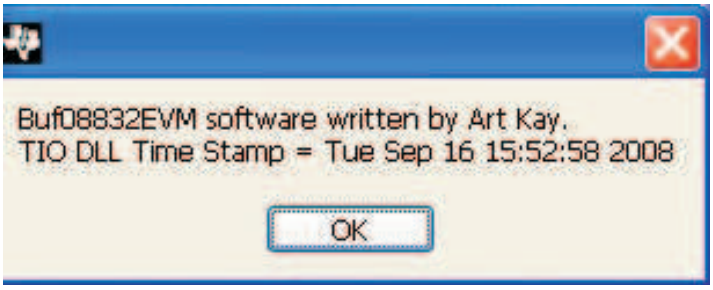

Figure 12. BUF08832EVM Software About Button

5 BUF08832EVM Software Overview

This section discusses how to install the BUF08832 software.

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5.1 Starting the BUF08832EVM Software

The BUF08832 software can be operated through the Windows *Start* menu. From Start, select *All Programs*; then select the BUF08832EVM program. Figure 13 shows how the software should appear if the EVM is functioning properly.

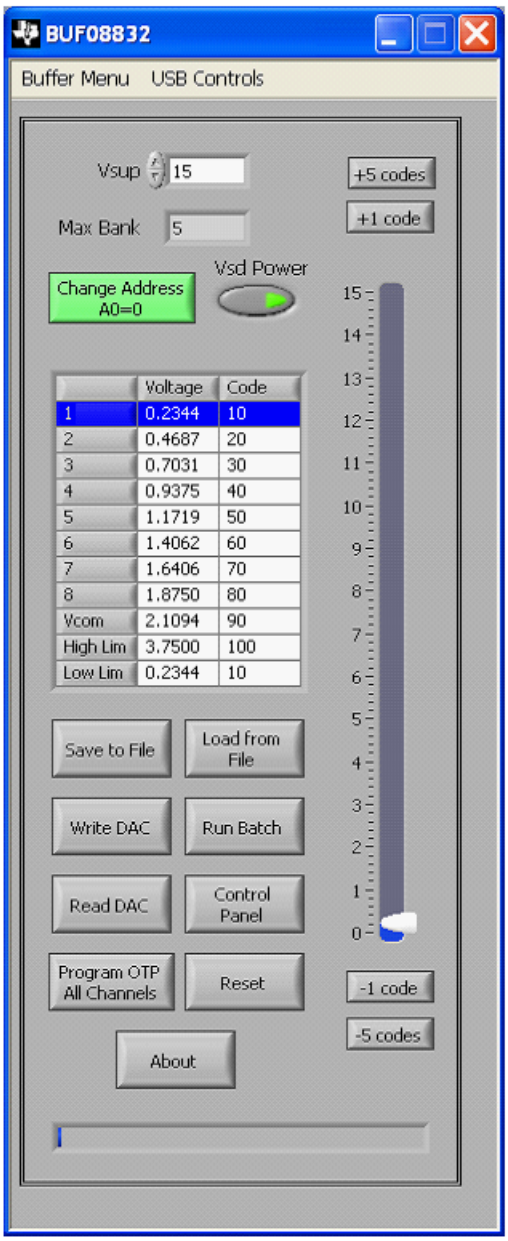

Figure 13. BUF08832EVM Software Functioning Properly

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Figure 14 shows an error that pops up if the computer cannot communicate with the EVM. If you receive this error, first check to see that the USB cable is properly connected. This error can also occur if you connect the USB cable before the USB DIG Platform 9V power source. A second possible reason for this problem is that there may be a problem with your computer USB human interface device driver. Make sure that when you plug the in the USB cable, the computer recognizes the device. If the sound is on, you will hear the distinctive sound that you expect when a USB device is properly connected to the PC.

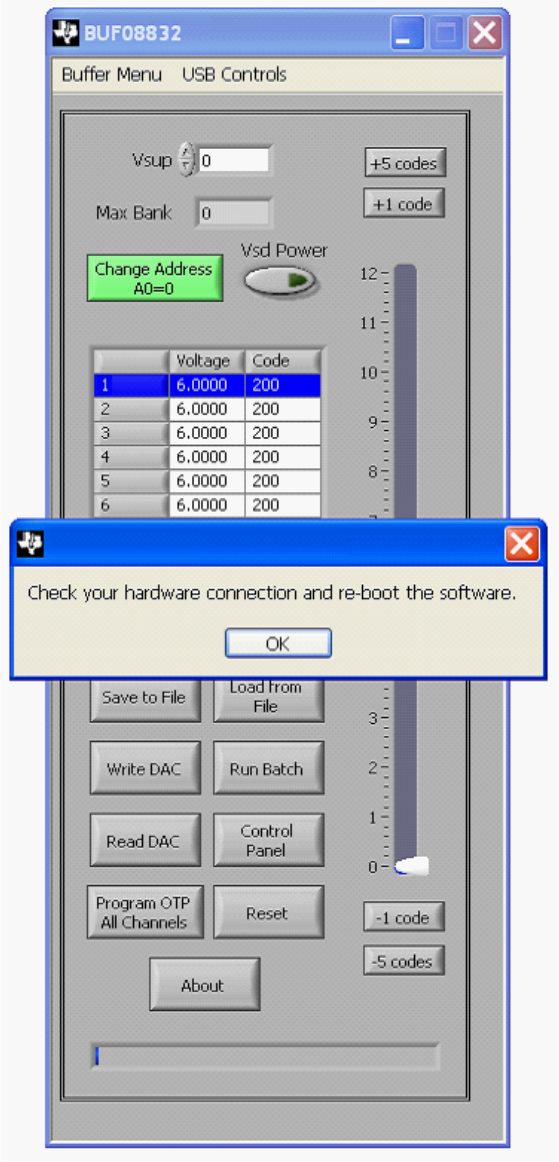

Figure 14. BUF08832EVM Software: No Communication with the USB_DIG_Platform

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5.2 Using the BUF08832 Software

5.2.1 I²C Address Selection

As mentioned previously in the *BUF08832_Test_Board Features* section (see Section 3.7), jumper JMP1 is used to set the I²C address pin of the BUF08832. Figure 15 shows how the hardware and software must both be set to allow for communication between the BUF08832EVM and the software. Without jumper JMP1 and the software address button configured correctly, the software will not be able to communicate with the BUF08832 device.

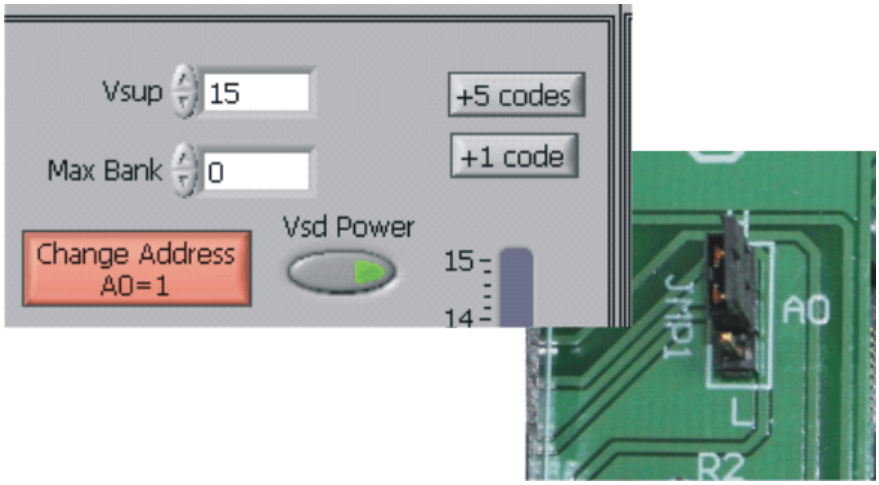

Figure 15. BUF08832_Test_Board Jumper JMP1 Set For Logic '1'

When JMP1 and the software are set as shown in Figure 16, the second I²C address can be configured.

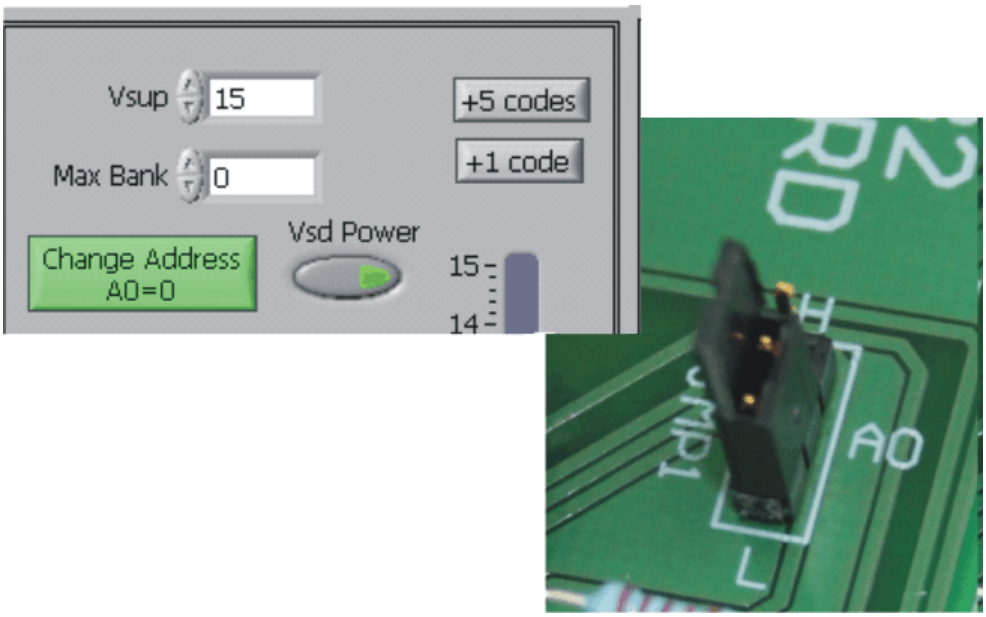

Figure 16. BUF08832_Test_Board Jumper JMP1 Set For Logic '0'

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5.2.2 Measuring the Power Supply

You must measure the power supply (V_S) with respect to the GND on the BUF08832_Test_Board and enter it in the V_{SUP} field located in the top section of the software interface, as shown in Figure 17.

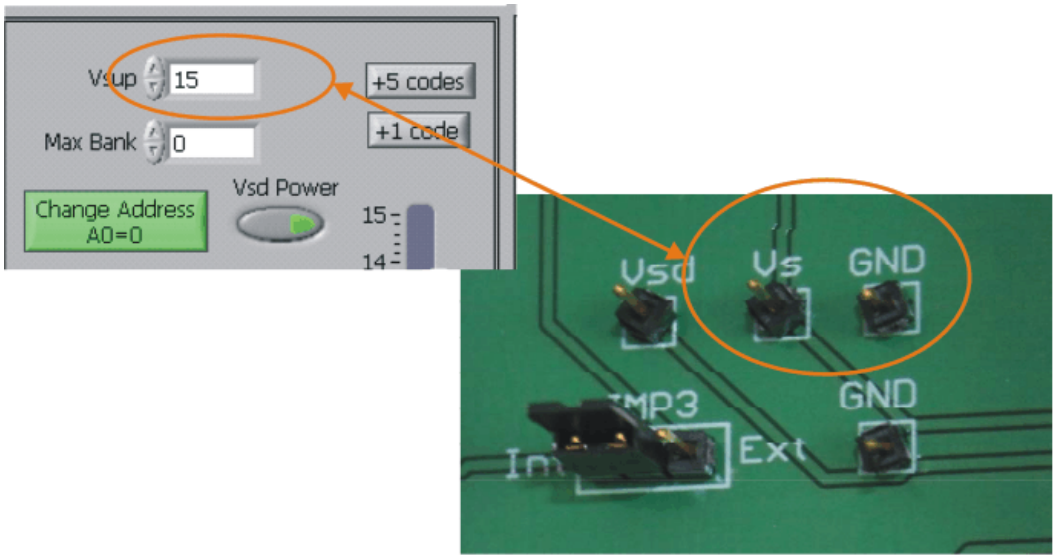

Figure 17. Measuring and Entering Power-Supply Voltage

The voltage out of each DAC is calculated according to the V_S value entered. For example, changing the value in the channel 6 cell as shown below immediately changes the output of channel 6 to 0.996V. The calculation is performed according to Equation 1.

$$V_{DAC_CHANNEL} = \frac{V_S \times Code_in_Decimal}{1024} \quad (1)$$

Example 1.

Channel 6: Code 44 (hexadecimal) = 68 (decimal)

$$V_{DAC_CHANNEL} = \frac{15V \times 68}{1024} = 0.996V$$

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5.2.3 Read DAC Button

By pressing the **Read DAC** button in the BUF08832EVM software, all of the BUF08832 DAC/V_{COM} registers are read to obtain the respective current register contents. Once the read procedure is complete, all of the corresponding text boxes are updated to show the current values present in the DAC/V_{COM} registers.

5.2.4 Write DAC Button

The method used to write the values in the DAC/V_{COM} registers is based on whether or not the Auto Write feature is enabled. The BUF08832 has two methods of writing information into the DAC/V_{COM} registers. The first method allows for the output voltage to change immediately after the writing to the DAC register. In the BUF08832EVM software, this mode is configured by enabling the Auto Write feature found in the Buffer Menu dropdown menu. In this mode, as an individual channel is written to, the output voltage changes as soon as the user moves to a different text box in the software. The second method of writing to the DAC/V_{COM} registers allows for the user to write multiple channels and then have all of the output voltages change at the same time rather than each channel voltage changing as soon as it is written to.

Disabling the Auto Write feature in the software allows the user to enter all of the values desired for all of the channels and then press the **Write DAC** button to change all of the output voltage of all of the channels at one time. When the Auto Write feature is enabled, no change occurs to the output voltages when the **Write DAC** button is pressed. No change occurs because after the text box for a given channel has been updated, as soon as another item in the software is clicked, the Auto Write feature automatically performs a write command to the updated channel that then updates the output voltage. When in the Auto Write enabled mode, the **Write DAC** button cannot be pressed with different data in the corresponding channel text boxes than the values already stored in the DAC/V_{COM} register; thus, no change occurs. Figure 18 shows the location in the Buffer Menu showing the Auto Write feature enabled. Clicking on the Auto Write feature again enables/disables the feature, depending on its current state.

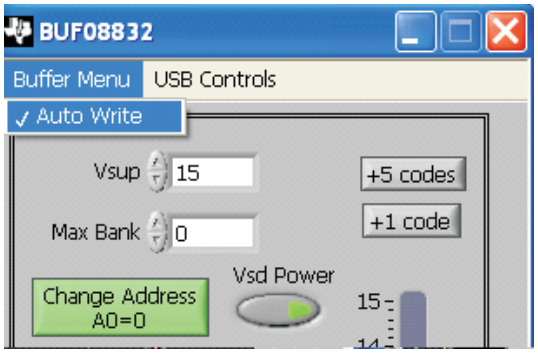

Figure 18. Auto Write Feature Enabled

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5.2.5 Reset Button

Pressing the **Reset** button in the BUF08832EVM software calls a General-Call Reset for the BUF08832. The status of the DAC/V_{COM} registers after the General-Call Reset depends on whether the OTP has been programmed or not. If the OTP has been programmed, the channel registers will be loaded with the most recent values programmed into the OTP memory. If the OTP memory has not been programmed, the channel registers will default to *1000000000*, or midsupply.

Pressing the **Reset** button does not generate a Read DAC call, so the corresponding channels are not updated. The **Read DAC** button must be pressed in order to update the text boxes to the respective current corresponding values.

5.2.6 Save to File Button

The register configurations of the BUF08832 DACs are displayed in both analog voltage and in hexadecimal (see Figure 13). The DAC codes (that is, gamma voltages) can be saved into a text file using the **Save to File** button.

Pressing the **Save to File** button opens a file-save dialog box similar to that shown in Figure 19. Pressing the folder icon creates a new folder on your PC. It is a good idea to create a directory exclusively for BUF08832 DAC code (that is, gamma voltage) files. Enter a unique file name in the *Filename* field to store your BUF08832 register information. Press the **OK** button to save the file.

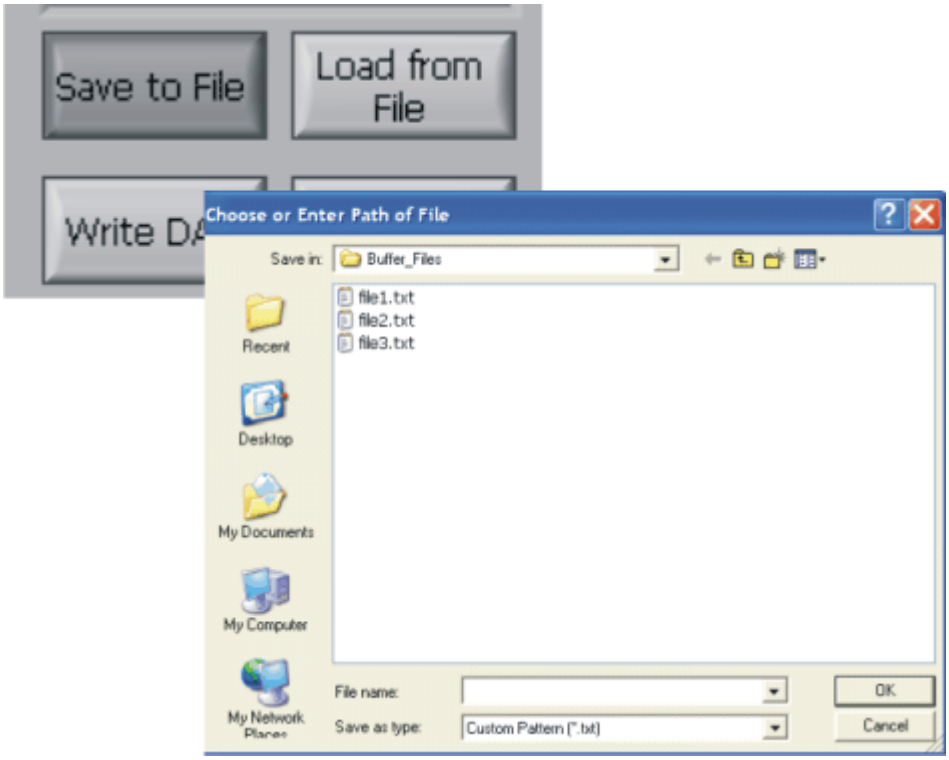

Figure 19. Save to File Dialog Box Button and Window

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Saved BUF08832 DAC codes (gamma voltages) exist in a text file that can be opened in a text editor, as Figure 20 illustrates.

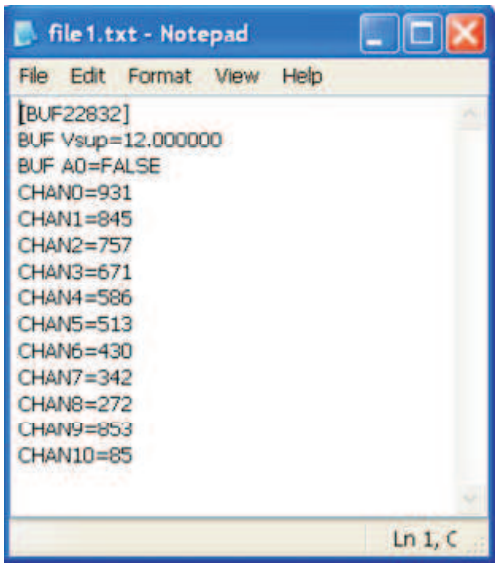

Figure 20. File Format of Saved Data

5.2.7 Load From File Button

The BUF08832EVM software is also able to load data saved from previous evaluations. A saved register configuration can be loaded into the BUF08832 using the **Load From File** button, as shown in Figure 21. The program remembers where you saved the last register configuration. Simply select the desired configuration and press *Open*.

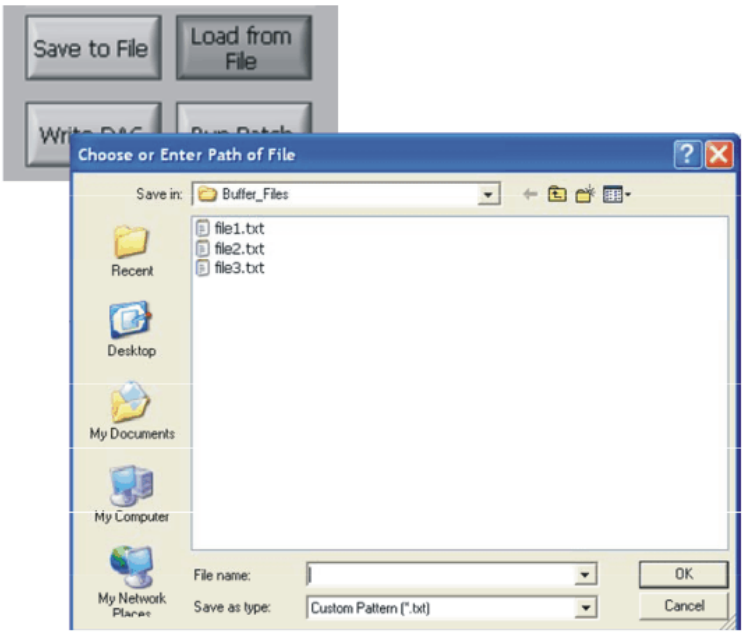

Figure 21. Load From File Button and Window

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5.2.8 Changing the DAC/V_{COM} Analog Voltage

The voltage of any of the DAC or V_{COM} channels can be adjusted in several ways. First, you can change the voltage by entering the desired voltage directly in the voltage text box. In order to be able to manually type the voltage into the text box, you must first click on the cell to be edited. Click a second time and the cell turns from blue to black, and allows the user to type the updated voltage in the cell. The hexadecimal DAC codes can be entered in the *Code* column in the same manner.

Another method of changing the voltage of a DAC or V_{COM} channel is through the use of the slider on the main software window. There is only a single slider that is used for all channels. In order to use the slider to adjust the voltage of a particular channel, that channel must first be selected. To select a channel, click on either the channel number, voltage, or code of a particular channel. The entire channel row highlights in blue to show the user that the channel is selected. Adjusting the slider bar then only updates the highlighted channel.

The final method to change DAC/V_{COM} voltages is through the **±1 Code** and **±5 Code** buttons on the main software window. These buttons allow for fine and coarse adjustments, respectively, to the highlighted channel, giving the user the ability to quickly step the channel output up or down as needed without having to manually enter the changes in the *Code* column.

5.2.9 Run Batch Button

The **Run Batch** button (as noted in Figure 22) enables the user to configure the BUF08832 to cycle through different register configurations in a continuous loop. When connected to the end application, this feature can be used to cycle through different gamma settings to determine what the optimal settings must be for a given application.

When the **Run Batch** button is pressed, a new dialog box displays as Figure 22 shows. The delay time is the amount of time allowed between loading new configurations into the BUF08832 DUT.

Use the **Single Step Up** and **Single Step Down** buttons to step through the selected files manually. The currently selected file name is displayed in the lower left corner area of the dialog box. Double-click on the file names to select them. Once a series of filenames have been selected, the check box turns dark. Double-click on a filename again to unselect it from the batch run.

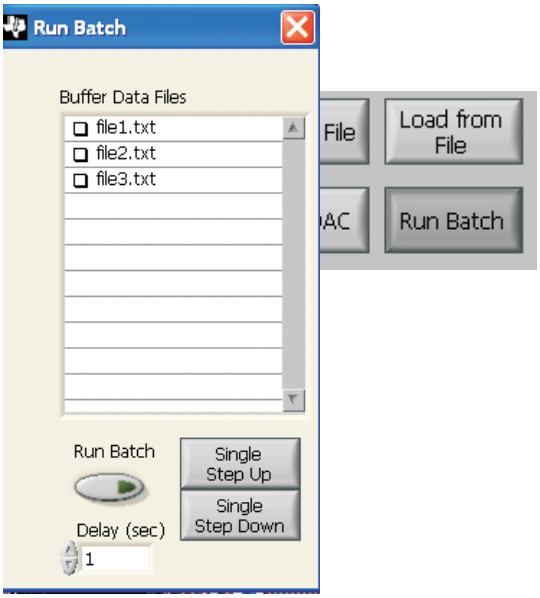

Figure 22. Run Batch Dialog Button and Window

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5.2.10 Control Panel Button

Pressing the **Control Panel** button brings up a display panel that allows you to adjust each channel using a set of graphical sliders, as shown in Figure 23. Simply drag the slider to adjust the desired channel output. The DAC code and corresponding output value of each channel change automatically. This function is similar to the slider present on the primary BUF08832EVM software window that changes based on the channel that highlighted (as discussed in the above section).

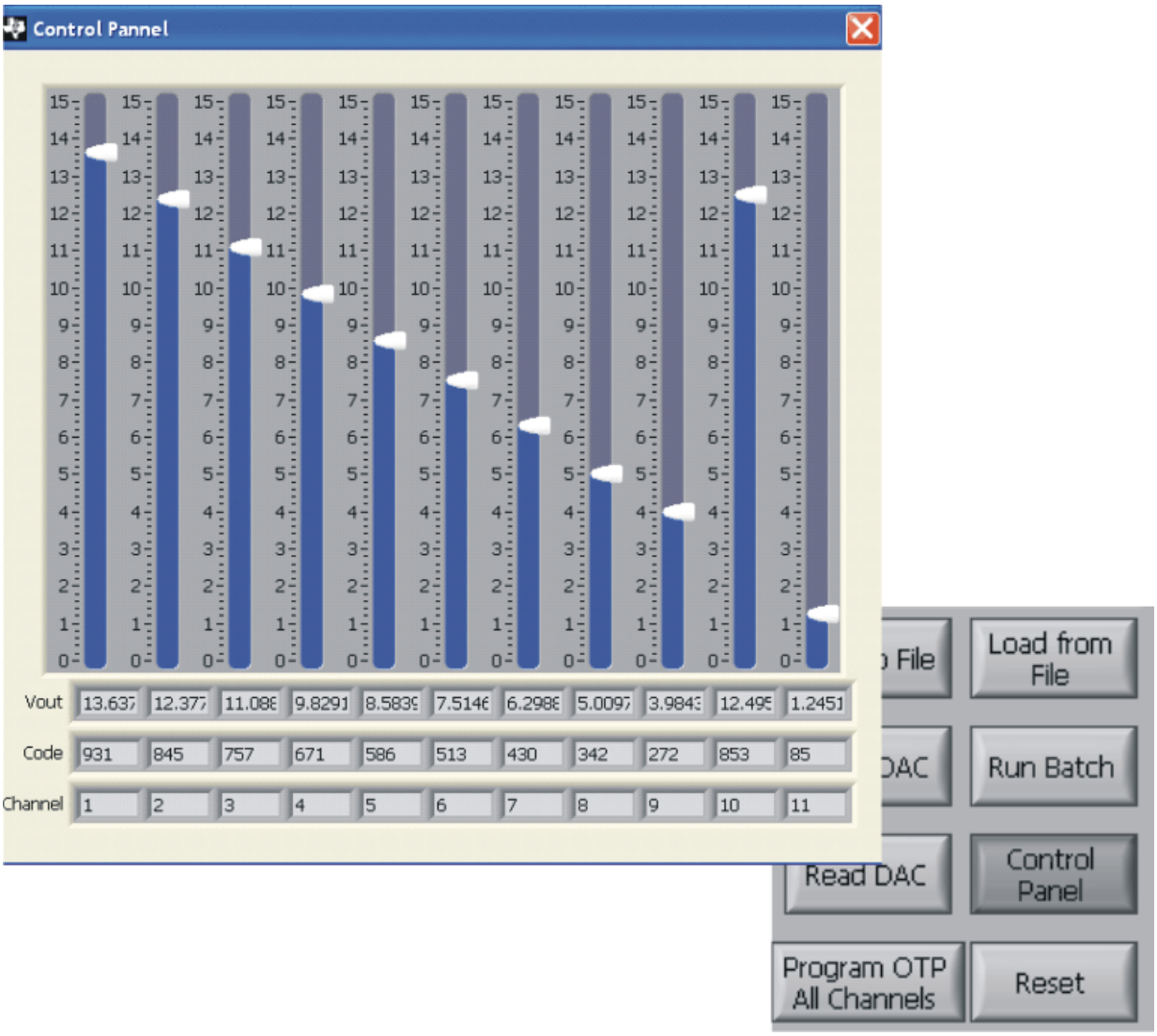

Figure 23. Control Panel Button and Window

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5.2.11 Program OTP All Channels Button

As Figure 24 shows, pressing the **Program OTP All Channels** button allows you to program a gamma curve into the nonvolatile memory in the BUF08832. All eight channels (including the V_{COM} channels) are then programmed simultaneously. The values are stored in the memory bank that is selected via the BKSEL switch (see Section 3.7.2).

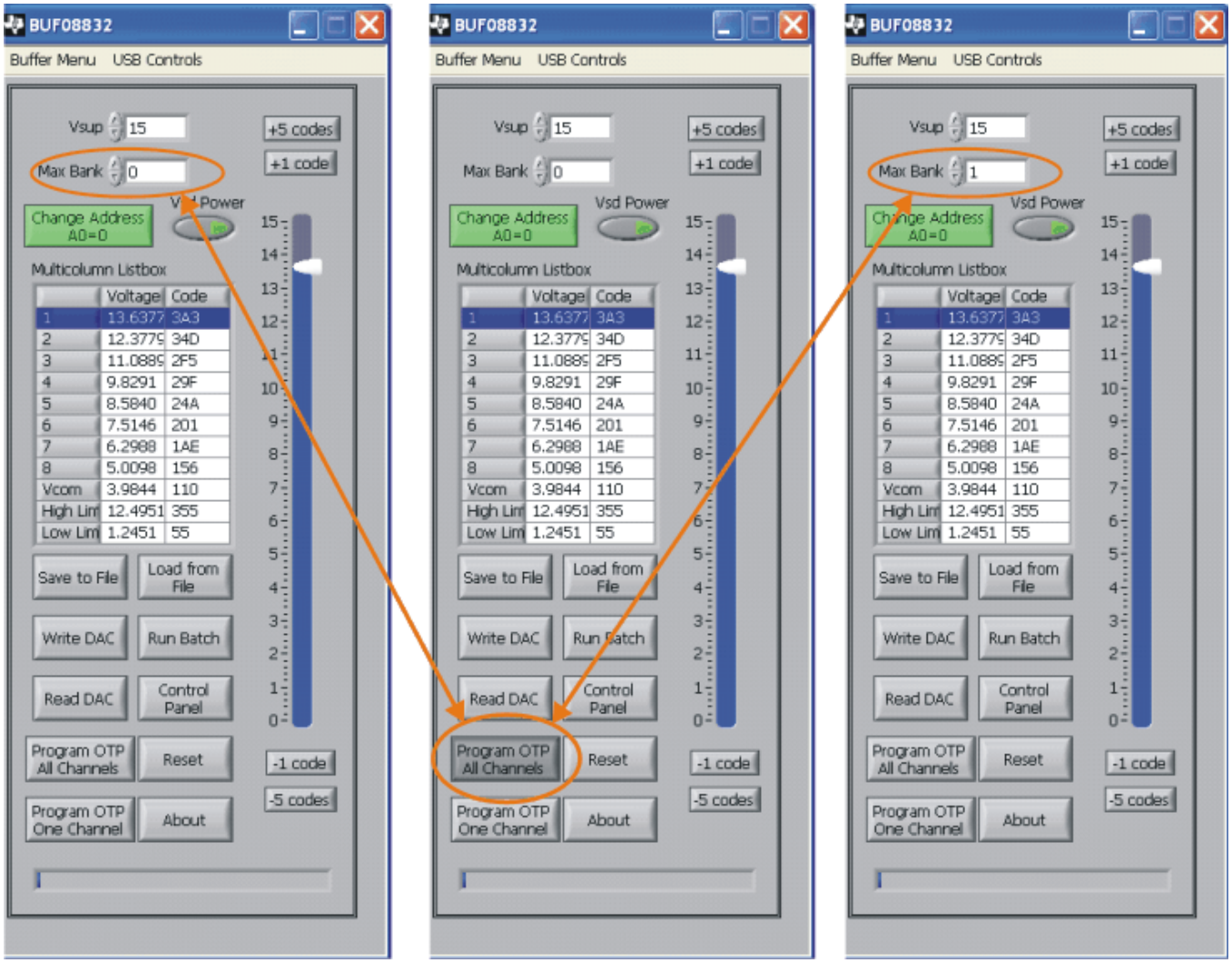

Figure 24. Program OTP All Channels Button

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5.2.12 Max Bank Field

The Max Bank field at the top of the software interface (as shown in Figure 25) shows how many times the memory of the most-programmed channel of the selected memory bank has been previously written to.

- None: Max bank shows 0
- Once: Max Bank shows 0
- Twice: Max bank shows 1
- Three times: Max bank shows 2
- 16 times: Max bank shows 15

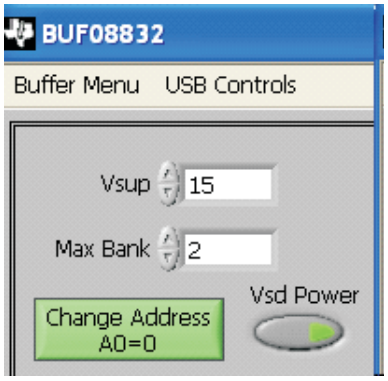

Figure 25. Max Bank Field

6 BUF08832EVM Documentation

This section contains the complete bill of materials and schematic diagram for the BUF08832_Test_Board. Documentation information for the USB_DIG_Platform can be found in the USB_DIG_Platform User's Guide, SBOU058, available at the TI web site at http://www.ti.com.

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6.1 BUF08832_Test_Board Schematic

Figure 26 shows the schematic for the BUF08832_Test_Board.

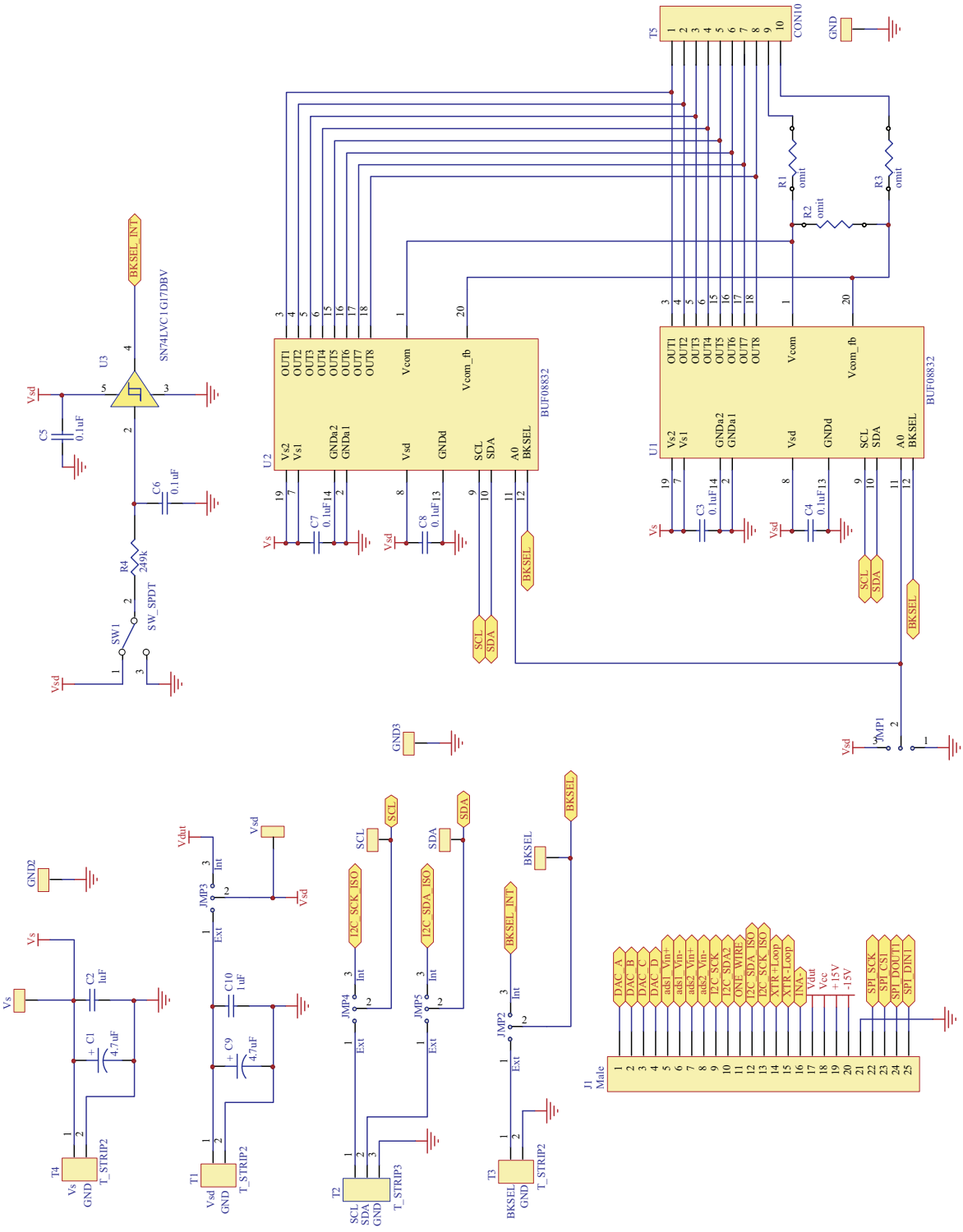

Figure 26. BUF08832_Test_Board Schematic

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6.2 BUF08832_Test_Board Bill of Materials

Table 4 lists the bill of materials for this EVM.

Table 4. BUF08832_Test_Board Bill of Materials

No.	Qty	Value	Ref Des	Description	Vendor	Part number
1	1	34Ω	R1	RES 34.0Ω 1% 50PPM 1/4W See Assembly Drawing	Vishay/Dale	CMF5034R000FHEB
2	1	1.2kΩ	R2	RES 1.21kΩ 1% 50PPM 1/4W See Assembly Drawing	Vishay/Dale	CMF501K2100FHEB
3	1	150Ω	R3	RES 150Ω 1% 50PPM 1/4W See Assembly Drawing	Vishay/Dale	CMF50150R00FHEB
4	1	249kΩ	R4	RES 249kΩ 1/16W .5% 0603 SMD	Susumu Co Ltd	RR0816P-2493-D-39D
5	2	4.7uF	C1, C9	CAP TANT 4.7µF 35V 10% SMD	Vishay/Sprague	293D475X9035C2TE3
6	2	1µF	C2, C10	CAP CER 1 µF 25V Y5V 0603	Murata Electronics North America	GRM188F51E105ZA12D
7	6	0.1µF	C3-C8	CAP .10µF 25V CERAMIC Y5V 0603	Kemet	C0603C104Z3VACTU
8	1		U1	Socket, TSSOP 28-Pin ZIF	ENPLAS	OTS-20(28)-0.65-01
9	2		U2	CONN RCPT .100" 10POS GOLD T/H	Samtec Inc	SS-110-G-2
10	1		U3	IC BUFFER SCHMIT TRIG SOT235	Texas Instruments	SN74LVC1G17DBVR
11	1	DSUB25M	J1	CONN D-SUB PLUG R/A 25POS 30GOLD (With Threaded Inserts and Board locks)	AMP/Tyco Electronics	5747842-4
12	1		S1	SWITCH TOGGLE SPDT .4VA PC MNT	E-Switch	200AWMSP1T1A1M2RE
13	3		T1, T3, T4	TERM BLOCK .2 IN 2 POS PCB	Tyco Electronics	1437671-1
14	1		T2	TERM BLOCK 3POS 5.08MM SCREWLESS	Tyco Electronics	1437671-4
15	1	T5 Cut to size	T5	CONN HEADER 10POS .100" SGL GOLD	Samtec	TSW-132-07-G-S
16	6		Pin Socket (U1)	Pin SOCKET RCPT .014-.026 30AU (R1,R2,R3)	AMP	5050863-5
17	8	TP cut to size	Test Points, All	CONN HEADER 1POS .100" SGL GOLD	Samtec	TSW-132-07-G-S
18	4	Standoff	—	Standoffs, Hex , 4-40 Threaded, 0.500" length, 0.250" OD, Aluminum Iridite Finish	Keystone	2203
19	4	Screw	—	SCREW MACHINE PHIL 4-40X1/4 SS	Building Fasteners	PMSSS 440 0025 PH
20	5	JUMP3 cut to size	JMP1-JMP5	CONN HEADER 3POS .100" SGL GOLD	Samtec	TSW-132-07-G-S
21	5		N/A	SHUNT LP W/HANDLE 2 POS 30AU	AMP/Tyco Electronics	881545-2
22	1	BUF08832	U1	IC CURR/PWR MON BI-DIR MSOP-10	Texas Instruments	BUF08832AIDGS

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EVM Warnings and Restrictions

It is important to operate this EVM within the input voltage range of of 5.7V to 9V; the BUF08832 Test Board within the supply voltage range of 9V to 20V; and the output voltage range of BUF08832 Test Board must remain below 20V.

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

Applying loads outside of the specified output range may result in unintended operation and/or possible permanent damage to the EVM. Please consult the EVM User's Guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative.

During normal operation, some circuit components may have case temperatures greater than +25°C. The EVM is designed to operate properly with certain components above +25°C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

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