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# Evaluation Board for AD7843/AD7873 Resistive Touch Screen Controllers

## FEATURES

**Easy access to the AD7843/AD7873**
**Connects to any PC USB port**
**Self-contained evaluation system**
**Test points for easy access to signals**
**Touch screen included**
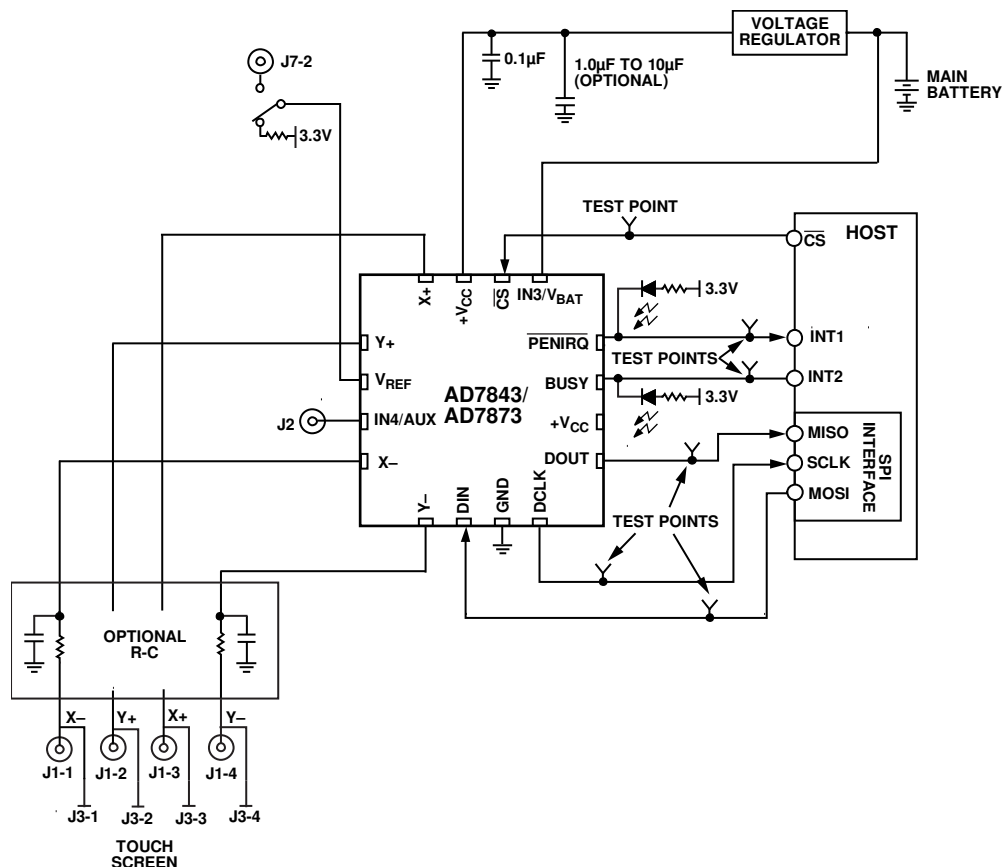
## PACKAGE CONTENTS

The AD7843/AD7873 evaluation board kit contains the following:

- The AD7843/AD7873 evaluation board

- A USB cable

- A CD with the evaluation software, schematics, and this user guide

- A 4-wire resistive screen

## GENERAL DESCRIPTION

The AD7843/AD7873 evaluation board allows the user to evaluate all features of the AD7843/AD7873. The evaluation software allows the user to change the settings on the AD7843/AD7873. The users can connect the touch screen to the J3 connector, or use the on-board variable resistors, to evaluate the touch screen function.

## EVALUATION BOARD BLOCK DIAGRAM



NOTES
1. THE AUX AND $V_{BAT}$ PINS ONLY APPLY TO THE AD7873. THE IN3 AND IN4 PINS ONLY APPLY TO THE AD7843.

*Figure 1.*

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## REVISION HISTORY

**12/09—Revision 0: Initial Version**

# EVALUATION BOARD

## SETTING UP THE EVALUATION BOARD

Follow these steps to set up the AD7843/AD7873 evaluation board:

- Install the evaluation software (CD) before connecting the board.
- Plug the USB connector from the USB port on your PC into the mini-USB socket on the evaluation board. The power indicator LED on the board should turn on.
- Ensure that all switches and links are in their default positions.
- Start the AD7843/AD7873 evaluation software.

## EVALUATION BOARD DESCRIPTION

The AD7843/AD7873 evaluation board allows the user to evaluate all features of the AD7843 and AD7873. The board is powered via the USB connection to the host PC. The evaluation software allows data to be read from and written to the AD7843/AD7873. Install the evaluation software on the PC before plugging in the board.

The evaluation board contains the following main components, which are also shown in the functional block diagram (see Figure 1):

- AD7843/AD7873 IC
- USB microcontroller IC, CY7C68013-CSP
- LED indicators for power and $\overline{PENIRQ}$
- EEPROM for USB initialization information
- Connector for USB interface
- Connector for touch screen
- Screw-top connectors for the following signals: X−, Y+, X+, Y−, +$V_{CC}$, $V_{REF}$, and GND
- Test points for the following signals: DOUT, DIN, DCLK, $\overline{CS}$, $\overline{PENIRQ}$, BUSY, +$V_{CC}$, and $V_{BAT}$.

The printed circuit board (PCB) schematics are shown in Figure 6 and Figure 7.

# EVALUATION BOARD HARDWARE

## CONNECTOR FUNCTION DESCRIPTIONS

**Table 1.**

| Name | Mnemonic | Description |
|------|----------|-------------|
| J6 | USB interface | Plug the USB cable directly from the PC into this connector. It is a type USB Mini-B socket. |
| J13-1 | Power | Power can be supplied to the board by either the USB cable or the power connector, J13. If L5 is in Position B, power is supplied via the USB cable. If L5 is in Position A, power is supplied from the J13-1 connector. |
| J13-2 | AGND | An external ground can be connected via the J13-2 connector. |
| J7-2 | EXT_VREF | Connector J7-2 can be used to apply a signal to the VREF input on the AD7843/AD7873. L6 must be in Position A for this connector to be linked to the AD7843/AD7873. If L6 is in Position B, 3.3 V is applied to the VREF input. |
| J2 | AUX | The J2 connector can be used to apply a signal to the AUX input on the AD7843/AD7873. |
| J5 | EXT_BAT | Connector J5 can be used to apply a signal to the VBAT input on the AD7843/AD7873. L7 must be in Position B for this connector to be linked to the AD7843/AD7873. |
| J3 | Touch screen | The touch screen included with the demonstration kit can be connected directly into the AD7843/AD7873 demonstration board using this connector. Connect as follows: X− to J3-1, Y+ to J3-2, X+ to J3-3, and Y− to J3-4. |
| J1 | Touch screen | This connector can be used to connect a touch screen to the AD7843/AD7873. Connect as follows: X− to J1-1, Y+ to J1-2, X+ to J1-3, and Y− to J1-4. |

## LINK FUNCTION DESCRIPTIONS

**Table 2.**

| Name | Mnemonic | Default Position | Description |
|------|----------|------------------|-------------|
| L1 | X+ | A | This jumper selects the X+ input on the AD7843/AD7873. If the jumper is in Position A, the X+ input comes from the J1-3 or J3-3 touch screen connectors. |
| L2 | Y+ | A | This jumper selects the Y+ input on the AD7843/AD7873. If the jumper is in Position A, the Y+ input comes from the J1-2 or J3-2 touch screen connectors. |
| L3 | X− | A | This jumper selects the X− input on the AD7843/AD7873. If the jumper is in Position A, the X− input comes from the J1-1 or J3-1 touch screen connectors. |
| L4 | Y− | A | This jumper selects the Y− input on the AD7843/AD7873. If the jumper is in Position A, the Y− input comes from the J1-4 or J3-4 touch screen connectors. |
| L5 | Input power | B | This jumper selects the input power for the evaluation board. If the jumper is in Position A, power for the board must be supplied through the J13-1connector. If the link is in Position B, the USB connection supplies the power for the board. |
| L6 | REF input | A | This jumper selects the input signal to the reference input on the AD7843/AD7873. If the jumper is in Position A, REF is connected to Pin 2 of the J7 (J7-2) connector. An input voltage can then be connected to J7-1. If the link is in Position B, REF is connected to 3.3 V. |
| L7 | BAT input | A | This jumper selects the input signal to the VBAT input on the AD7843/AD7873. If the jumper is in Position B, VBAT is connected to the J5 connector. An input voltage can then be connected to J5. If the link is in Position A, VBAT is connected to a variable resistor, R9. The user can vary R9 to change the input voltage on the $V_{BAT}$ pin. The maximum resistance of R9 is 10 kΩ. |

## INDICATOR LED DESCRIPTIONS

**Table 3.**

| Name | Mnemonic | Description |
|------|----------|-------------|
| D1 | $\overline{PENIRQ}$ | This LED indicates when lit (green) that the $\overline{PENIRQ}$ interrupt is active on the AD7843/AD7873. |

# EVALUATION BOARD SOFTWARE

The AD7843/AD7873 evaluation software configures the part in master mode; therefore, unless the screen is touched, no measurements are taken.

The user can change the register settings, plot, and save data from the AD7843/AD7873 and plot the X and Y positions using the evaluation software.

## INSTALLING THE SOFTWARE

Install the software before the evaluation board is plugged into the host PC. The evaluation software is installed by running the **AD7843/73EvaluationSoftwareInstall.exe** program, found on the CD within the evaluation board kit. The user must agree to Analog Devices, Inc., licensing agreement before the software can be installed. The software installs and saves into the **AD7843/73 Evaluation Software** directory.

## RUNNING THE SOFTWARE

Before running the software, ensure that the evaluation board is plugged into the USB port of the host PC. Run the software from the **AD7843/73 Evaluation Software** directory. When the software starts, the **AD7873 Communication Demo** dialog box appears, as shown in Figure 2.

If the software downloads properly, a **Download Ok** message appears in the lower left corner of the **AD7873 Communication Demo** dialog box. If this message does not appear, the software has not initialized properly. If this happens, exit the software and restart it. If an error persists, exit the software, disconnect the USB connector from the board, reconnect the USB connector to the board, and reinstall the evaluation software.
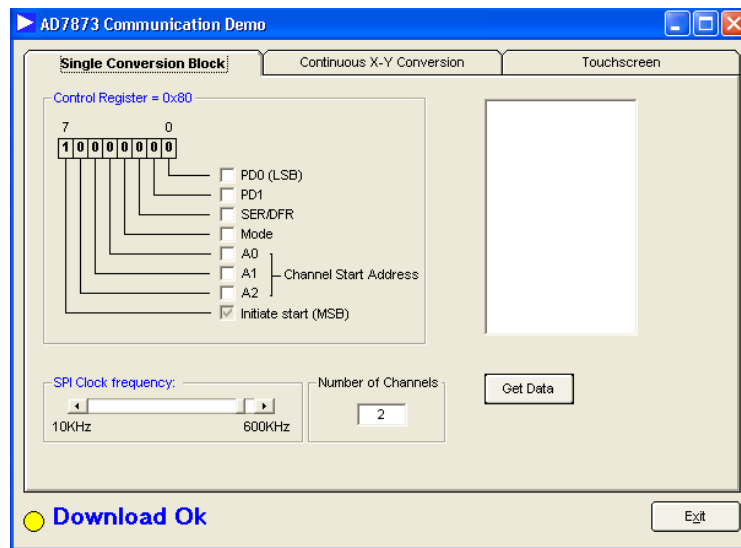


Figure 2. AD7843/AD7873 Evaluation Software Start-Up Dialog Box

# EVALUATION DEMONSTRATION

The evaluation demonstration allows the user to set up the AD7843/AD7873 control register according to requirements. The demonstration also displays the X and Y coordinates

## SINGLE CONVERSION BLOCK

The **Single Conversion Block** tab allows user to read and modify the values of the Control Register bits. By using the software, the user can program the main features of the AD7843/ AD7873. When any of the programmable features change, the control register bit display section is updated automatically.

### Control Register

Users can write to the control register by clicking on the corresponding bit boxes. The programmable features in the control register are the following: the power management bits (**PD1**, **PD0 (LSB)**), the single or differential mode (**SER/DFR**), the ADC mode (8 bits or 12 bits, **Mode**), the ADC **Channel Start Address** (**A2**, **A1**, **A0**), and the **Initiate start (MSB)** bit.

The user can read specific conversion results by supplying the channel address in the control register bits (**A2**, **A1**, **A0**). To read more than one channel, insert the number of channels you want read into the **Number of Channels** box. Click **Get Data** to see the results of the ADC conversion on the right side of the screen.

The user can modify the **SPI Clock frequency:** setting from 10 kHz to 600 kHz by using the slider shown in Figure 3.
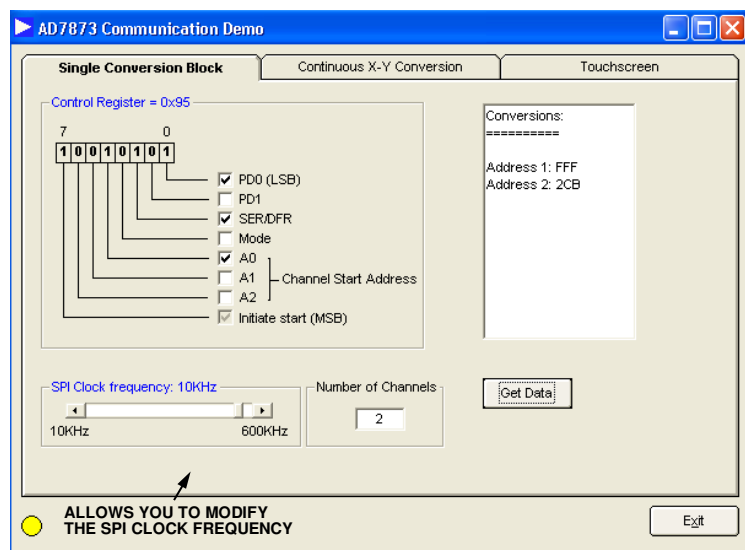


*Figure 3. Single Conversion Block*

## CONTINUOUS X-Y CONVERSION

When the user clicks the **Continuous X-Y Conversion** tab, the screen shown in Figure 4 appears. ADC values measured by the AD7843/AD7873 can be graphed on this screen. This screen also allows the user to program **PD0 (LSB)**, **PD1**, **SER/DFR**, and the mode bits contained in the control register (Address 0x90).

The evaluation board offers the following three options to measure the X and Y coordinates:

- Connect the screen provided in the evaluation kit to Connector J3.
- Connect any other screen to Connector J1.
- Use the variable resistors, R7 and R6, to simulate the resistance of the screen.

### Connecting a Touch Screen to the Board

Follow these steps to connect the touch screen included in the evaluation board kit to the board:

- Use Connector J3.
- Ensure that L1, L2, L3, and L4 are in Position A.
- Connect the 4-wire resistive screen with the green side of the flex tail facing the board. When it is secure in the connector, flip the tail over so that the board lies flat with the green side of the flex tail facing upward. The included touch screen requires a strong activation force. When using the screen, ensure that you press hard on it.
- Use Connector J1 to connect any other touch screens to the board.

### Using the Variable Resistors

If no touch screens are available, the variable resistors, R7 and R6, can be used to mimic a touch screen. Ensure that L1, L2, L4, and L6 are in Position B. The variable resistors can then be adjusted to mimic a user touching a screen.
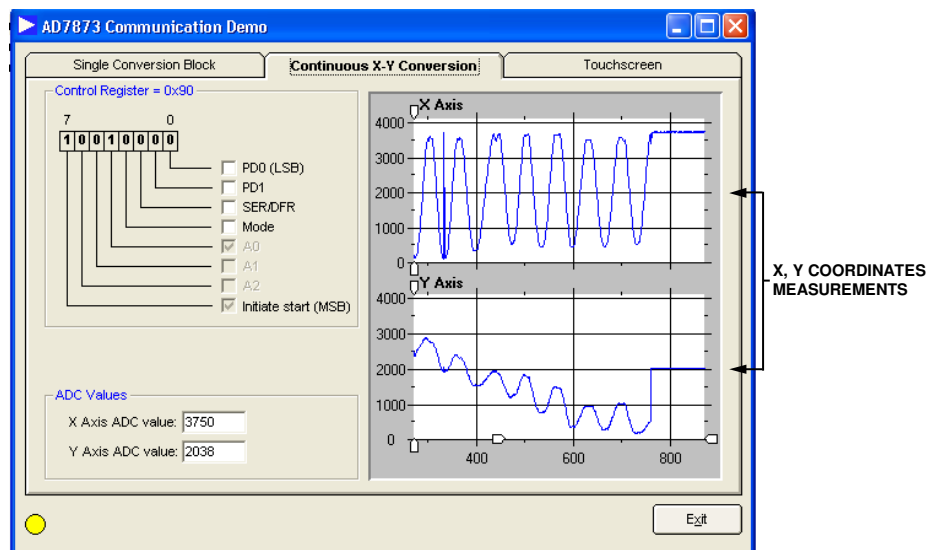


Figure 4. Result Plotting Screen

## TOUCHSCREEN

Click **Continuous X-Y Conversion** to display the **Touchscreen** window, see Figure 5. The X and Y coordinates from the screen are displayed in Figure 5.

The window approximates a real touch screen application. If a touch screen is connected to the AD7843/AD7873 evaluation board, then any touch on the screen is plotted in this window.

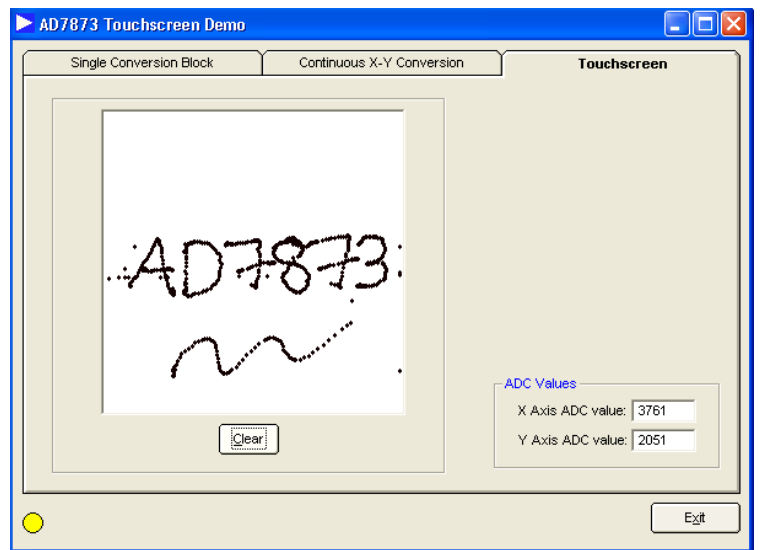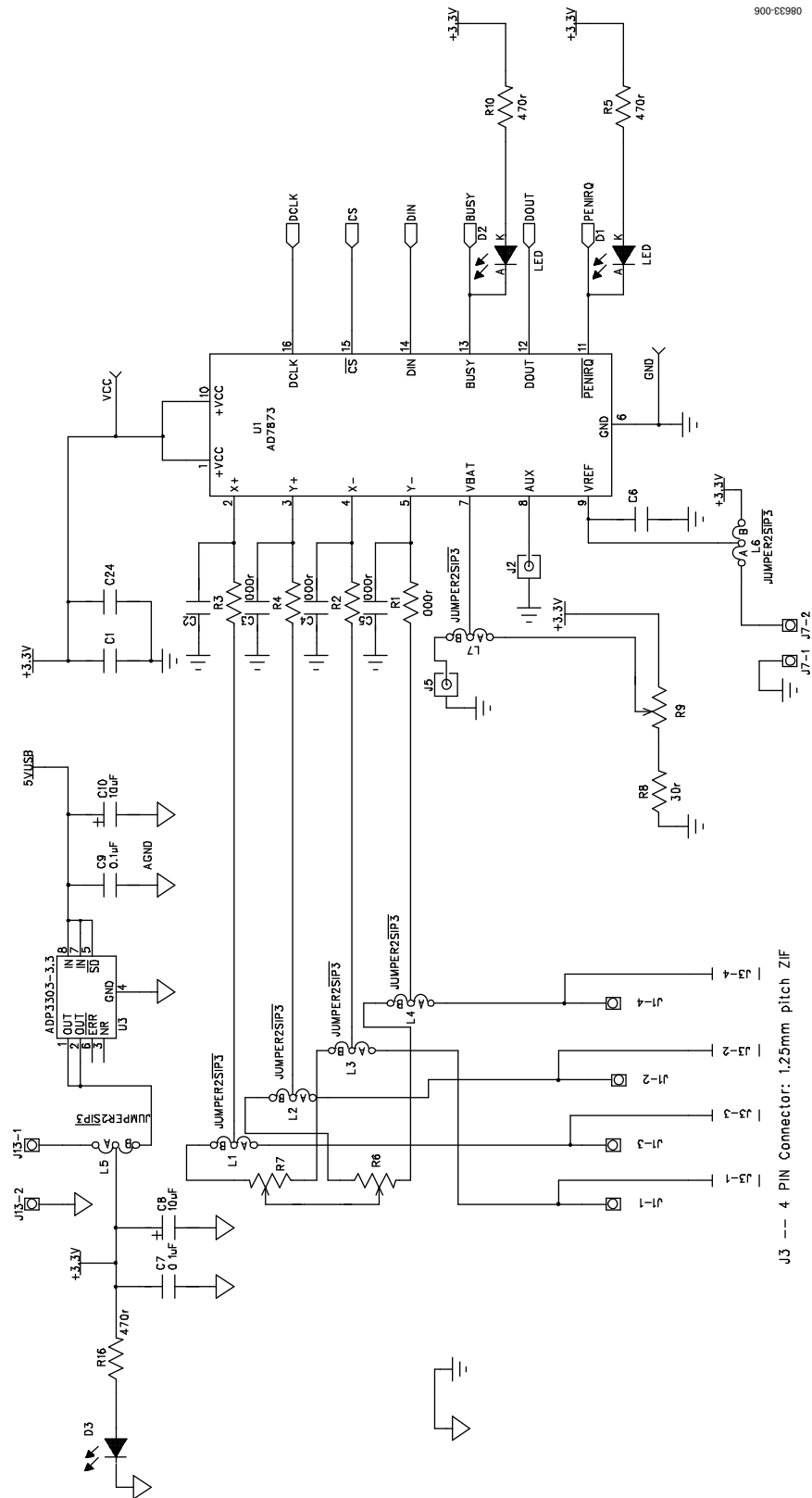The **Clear** button deletes everything written on the screen.



*Figure 5. Touchscreen Window*

# SCHEMATICS



*Figure 6. Evaluation Board Schematic AD7843/AD7873 Section*
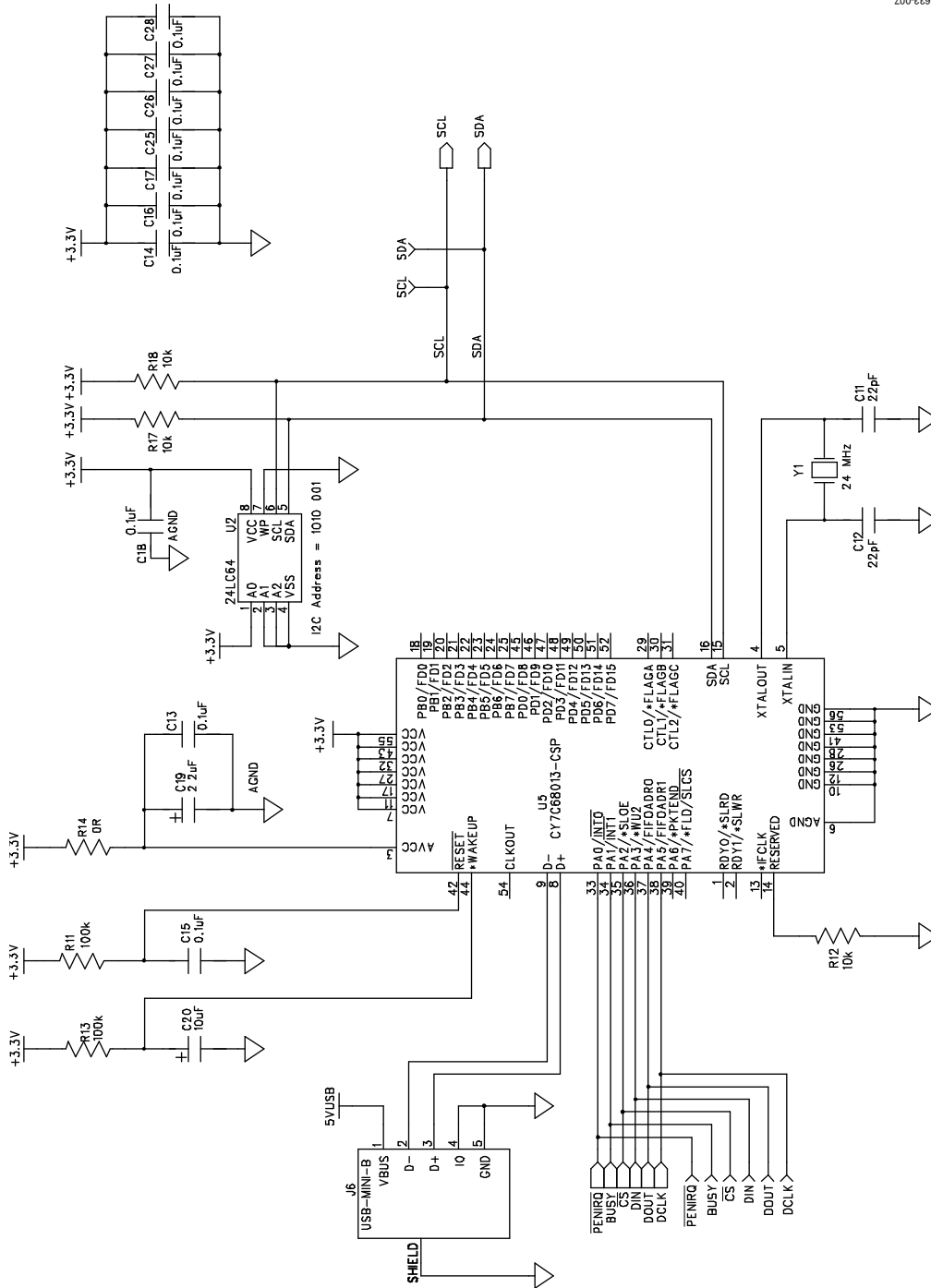
*Figure 7. AD7843/AD7873 Evaluation Board Schematic USB Section*
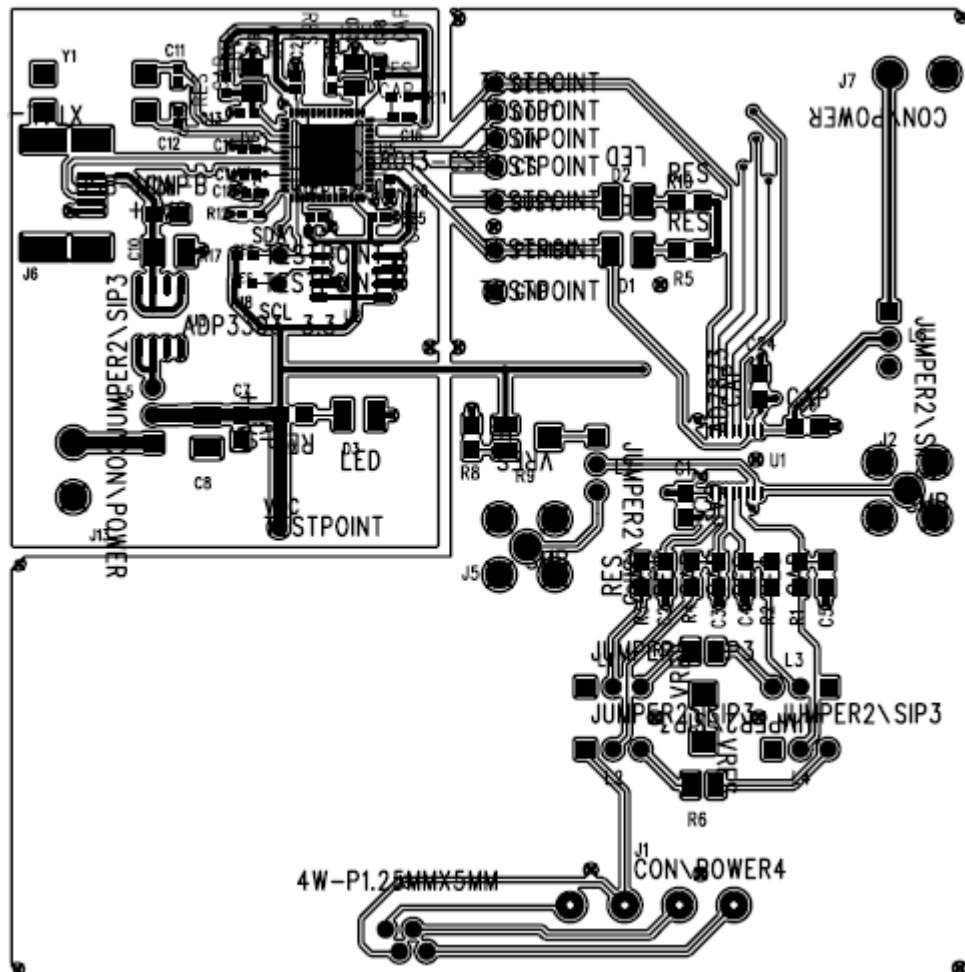
Figure 8. AD7843AD7873 Evaluation Board Component Side

# NOTES

## ESD CAUTION

**ESD (electrostatic discharge) sensitive device.**
Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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