ISL24212IRTZ-EVALZ Evaluation Board User Guide

Description

The ISL24212IRTZ-EVALZ evaluation board is a standalone demonstration of the ISL24212 V_{COM} calibrator. The user can use the on-board buttons to control the ISL24212 V_{COM} voltage as well as to write the current V_{COM} value to the ISL24212 internal EEPROM (see ISL24212 datasheet for details). In addition, an optional software tool is available to assist with making the necessary calculations and component selections for designing with the ISL24212.

Overview

Powering the ISL24212IRTZ-EVALZ

To power the ISL24212IRTZ-EVALZ evaluation board, connect a power supply to the power pins on the top edge of the board (Figure 1). The board operates with an analog supply voltage (A_{VDD}) of 4.5V to 19V, but EEPROM writing can only be done with analog supplies greater than 10.8V. The digital supply voltage (V_{DD}) range is 2.25V to 3.6V.

Enabling the ISL24212

To evaluate the ISL24212 V_{COM} calibrator, it must be enabled by bringing CE (Counter Enable, pin 8) high. Jumper JP1 determines the state of CE.

To enable V_{COM} adjustment and EEPROM programming, install a jumper between pins 2 and 3 of JP1, to connect CD to VDD.

To disable V_{COM} adjustment and EEPROM programming, remove all jumpers from JP1. The internal pull-down on the CE pin puts CD to ground when it is not externally connected. In this state, the ISL24212 still recalls the stored V_{COM} voltage when powered on, but it ignores any attempt to reprogram EEPROM.

Testing the ISL24212

Probe points are available on the evaluation board to monitor the voltages and functionality of the ISL24212 (Figure 2). These points allow measurement of voltages at the R_{SET}, DVR_OUT, CTL, and CE pins. The buffered V_{COM} voltage is presented at the VCOM_OUT node. Depending on the application, the feedback connection between VCOM_OUT and INN can be modified for desired performance.
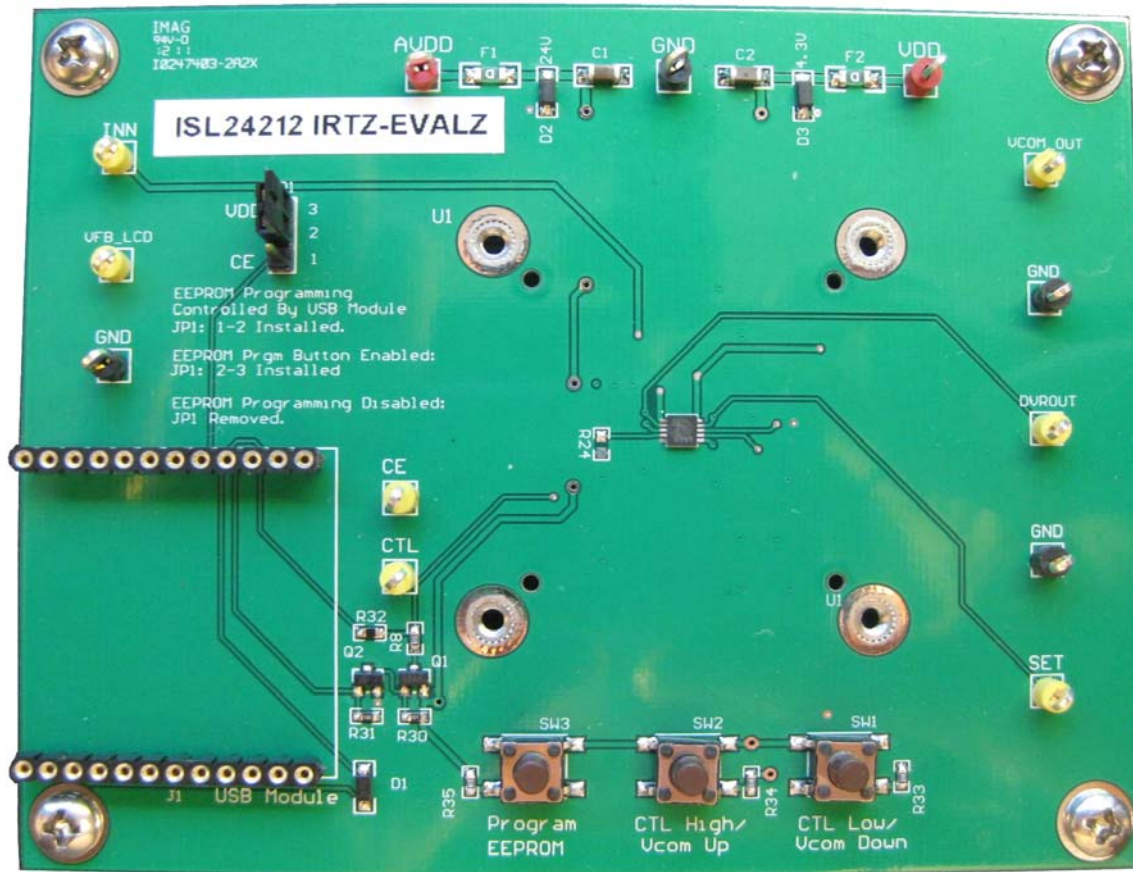

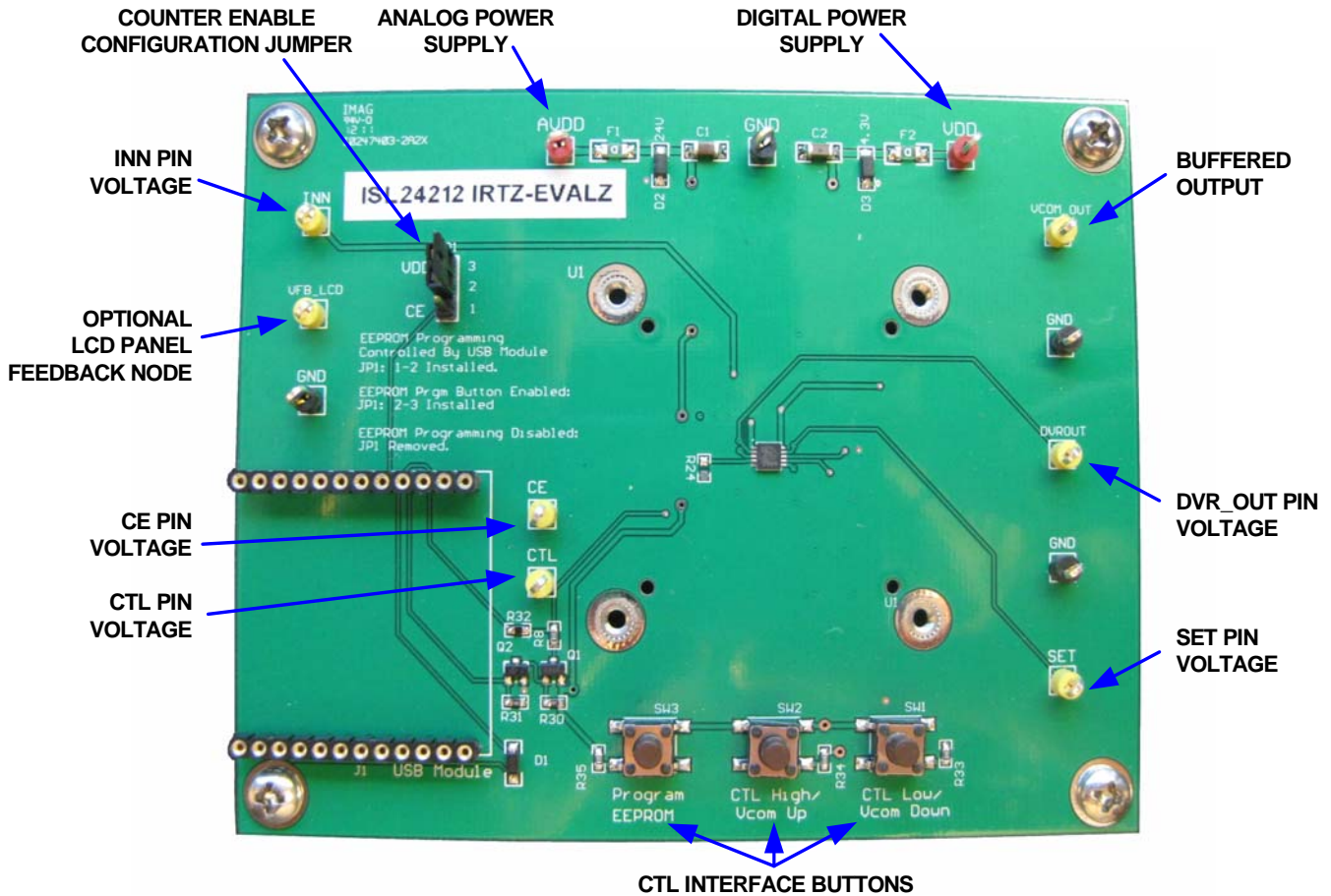**FIGURE 1. ISL24212IRTZ-EVALZ EVALUATION BOARD**

FIGURE 2. EXTERNAL CONNECTIONS AND JUMPERS

Using the Interface Buttons

Three buttons are available on the ISL24212IRTZ-EVALZ board to control the CTL interface line and allow communication with the ISL24212.

To increase the voltage at V_{COM}, press the **CTL High** button. This pulls the CTL line up to V_{DD}, which decrements the internal counter and increases the V_{COM} voltage.

To decrease the voltage at V_{COM}, press the **CTL Low** button. This pulls the CTL line down to GND, which increments the internal counter and decreases the V_{COM} voltage.

To program the part after the desired V_{COM} voltage is achieved, press the **Program EEPROM** button. This pulls CTL to A_{VDD} (greater than the required 4.9V) to trigger an EEPROM write.

Hardware Setup

1. Verify that JP1 is installed in positions 2-3.
2. Connect power supply grounds to the GND post.
3. Apply analog supply (4.5 to 19V) to A_{VDD} post.
4. Apply digital supply (2.25 to 3.6V) to V_{DD} post.
5. Press the **CTL High/Vcom Up** or the **CTL Low/Vcom Down** button to adjust the V_{COM} voltage available at VCOM_OUT.
6. Press the **Program EEPROM** button to store the current register value in EEPROM to be loaded upon start-up.

Evaluation Software

An optional graphical user interface (GUI) software tool is available to assist with making the calculations and component selections typically required when designing with the ISL24212. For example, the software helps select resistor values for tuning V_{COM} across a desired voltage range.

NOTE: This application note contains screenshots of the GUI at the time this user guide was written. Subsequent GUI versions may appear differently.

Software Installation

The ISL24212IRTZ-EVALZ software can be installed from the CD-ROM that accompanies the evaluation board or from an installer file downloaded from the ISL24212 device information page on the Intersil web site.

Launch the "ISL24212 Installer v1.0.exe" file and follow the instructions (Figure 3). The default installation adds an "Intersil" directory to the "Start Menu\Programs" tree. The directory contains a shortcut to the ISL24212 executable, and an uninstaller.

The default install option places the main program files in the C:\Program Files\Intersil\ISL24212 directory; however, the location can be customized if desired.
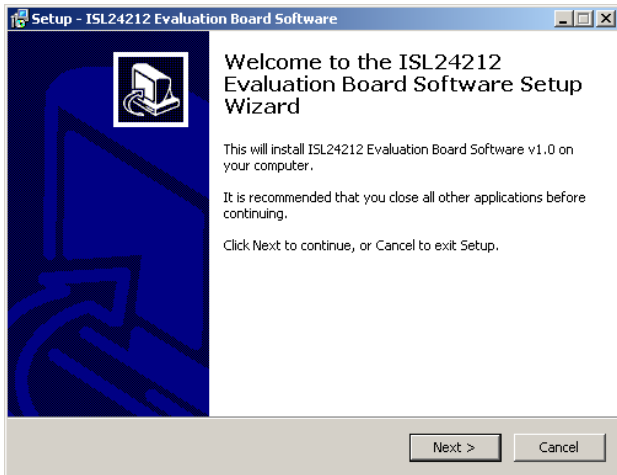

FIGURE 3. INSTALLER WINDOW

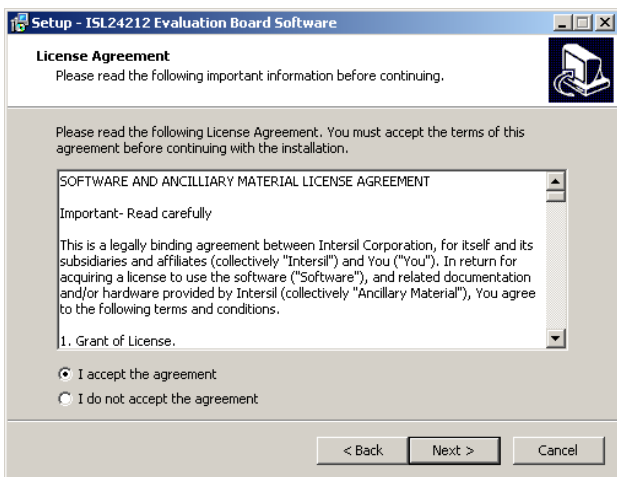Click **Next** to continue to the license agreement (Figure 4).

FIGURE 4. LICENSE AGREEMENT

Read the license agreement, choose to accept (or not accept) the license agreement, and then click **Next**. The **Select Destination Location** window opens (Figure 5).
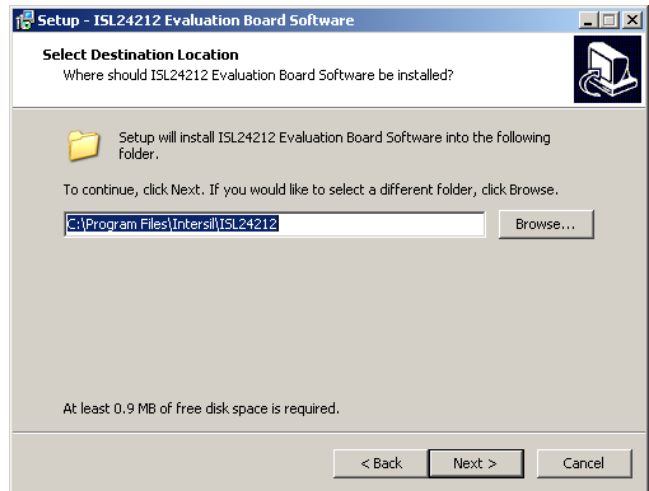

FIGURE 5. SELECT INSTALLATION DIRECTORY

To use a directory different from the default location, click the **Browse** button. Click **Next** to continue to the **Select Start Menu Folder** screen (Figure 6).
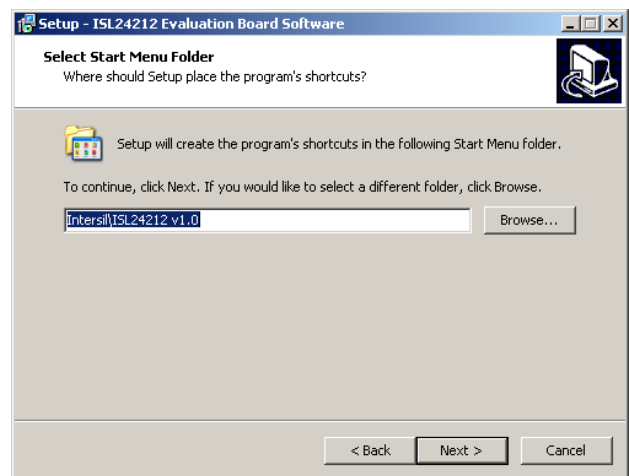

FIGURE 6. SELECT START MENU FOLDER

Click **Next** to create the Intersil folder in the **Start** menu. The **Ready to Install** window opens (Figure 7).
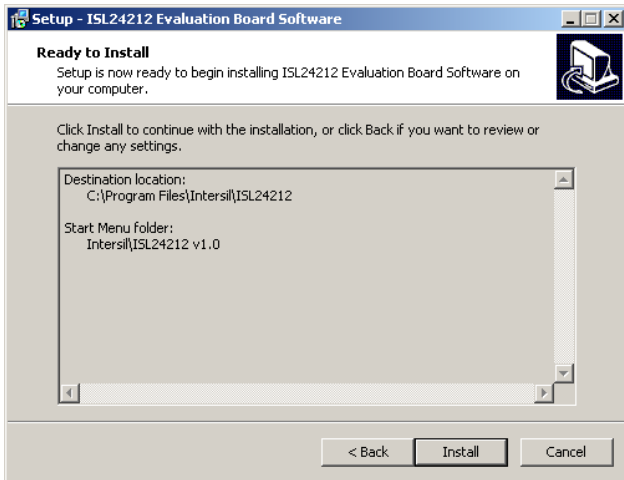

FIGURE 7. BEGIN INSTALLATION

Click **Install** to copy all the necessary files to the PC.

Installation is now complete. Re-boot the PC if requested.

Using the Software

Launch the software from the default location or from the selected installation directory. The default location is:

Start Menu\Programs\Intersil\ISL24212

After the program has launched, you should see the screen shown in Figure 9. The window is divided into two parts. From left to right are the **Calculator** section, in which you also do configuration, and the simplified schematic, which is provided for reference.

ISL24212 Calculator

Use the calculator (Figure 8) to calculate the appropriate values for R1 and R2 from the desired voltage range, or to calculate the resulting voltage range from the existing values of R1 and R2.
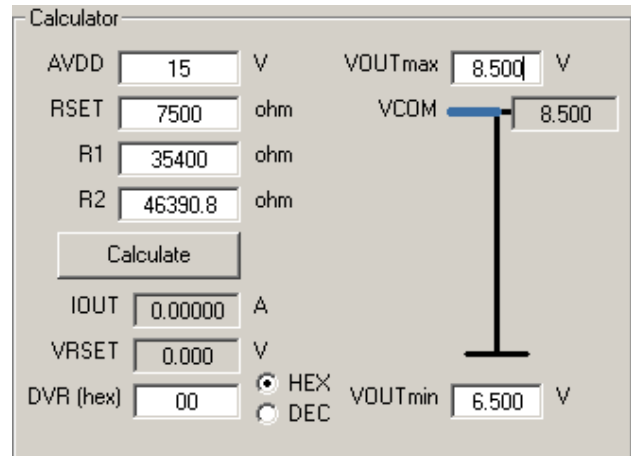

FIGURE 8. CALCULATOR PANEL

Note that when the **AVDD** and **RSET** fields are clicked, the dialog shown in Figure 10 appears and asks the user which values should be kept constant in the calculation. Respond as follows:

- Click **Yes** to keep existing resistor values, and the calculator derives the output voltage range from the existing values of R1 and R2.

- Click **No** to keep existing voltage range values, and the calculator derives the values of R1 and R2 required to achieve the desired output voltage range.
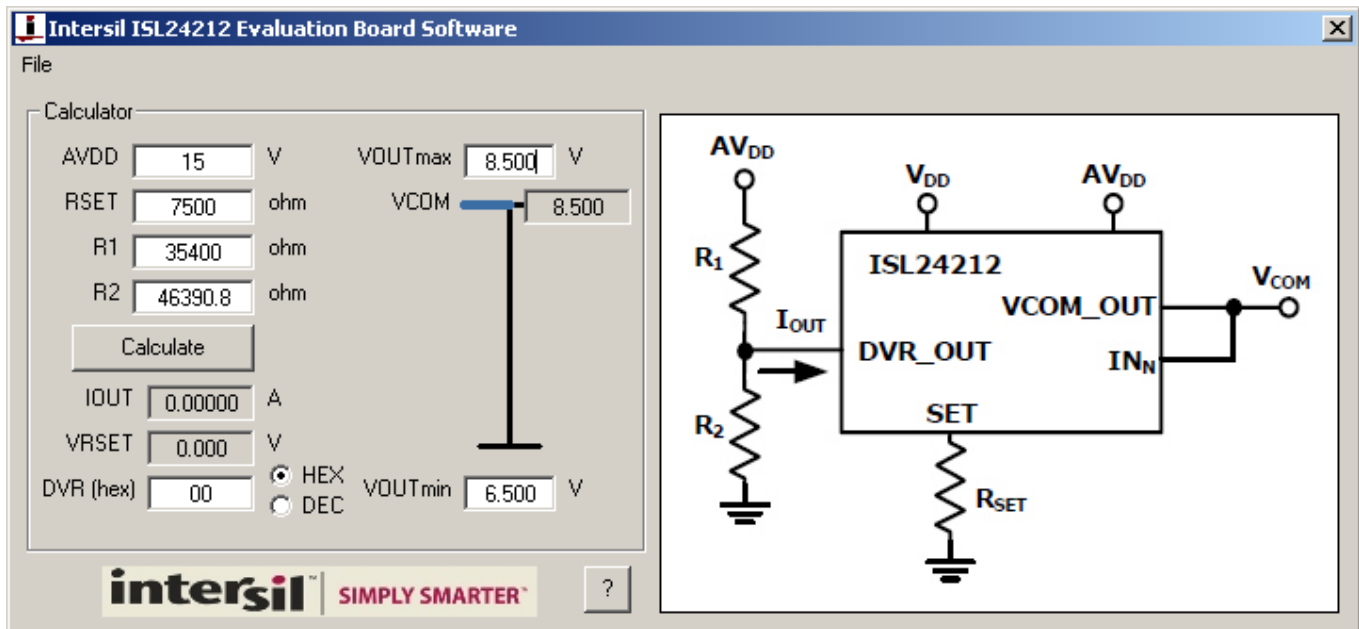

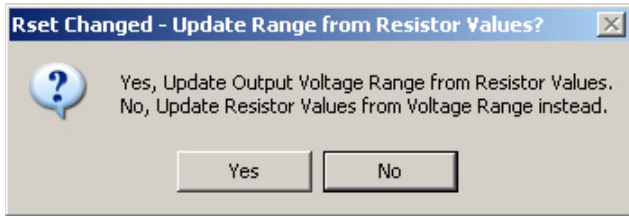**FIGURE 9. EVALUATION SOFTWARE WINDOW**

FIGURE 10. UPDATE CONFIRMATION

The procedure for realizing the voltage range when given predetermined R1 and R2 values is as follows:

1. Enter preliminary A_{VDD} and R_{SET} values.

2. Enter existing R1 and R2 values.

3. Read off resulting output voltage range (VOUTmax and VOUTmin).

4. Adjust R_{SET} and A_{VDD} values for desired output range (click **Yes** to select "Yes, Update Output Voltage Range from Resistor Values.").

The procedure for determining R1 and R2 when given a fixed output range is as follows:

1. Enter preliminary A_{VDD} and R_{SET} values.

2. Enter desired output voltage values (in appropriate order so VOUTmin does not exceed VOUTmax).

3. Read off resulting R1 and R2 values.

4. Adjust R_{SET} and A_{VDD} values for reasonable resistor values (click **No** to select "No, Update Resistor Values from Voltage Range instead.").

ISL24212 Register Simulator

The lower part of the **Calculator** section allows you to see the effects of modifying the ISL24212 data register, given the supply voltage and resistor configuration (Figure 11).

To see the effects of changing a register value, type the desired hexadecimal number into the **DVR (hex)** box. For decimal input, select the **DEC** radio button. The software adjusts numbers that exceed the range of 0-255 or 0-FF hex to the nearest valid value.

After entering the number, press the ENTER key on your keyboard to update the estimated V_{COM} voltage based on the resistor values and voltage range you have chosen. It should now be possible to achieve that value by using the buttons on the evaluation board.
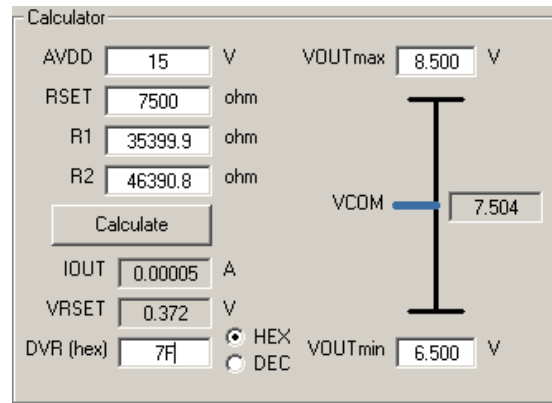

FIGURE 11. DVR/EEPROM OPERATIONS

The register value can be incremented and decremented by using the keyboard, as follows:

• Up Arrow: increment by 1

• Down Arrow: decrement by 1

• Page Up: increment by 16 (increment high nibble by 1)

• Page Down: decrement by 16 (decrement high nibble by 1)

The register value can also be adjusted with the mouse scroll wheel:

• Scroll Up: decrement by 1 (V_{COM} increase)

• Scroll Down: increment by 1 (V_{COM} decrease)

Visually, the program's theoretical estimate for output voltage at a given register value is displayed in the **Calculator** section (see blue bar in Figure 11). Note that this value may not be accurate due to discrepancies in voltage supply, leakage currents, and accuracy of resistor values.

Related Documentation

• ISL24212 datasheet

Troubleshooting

ISL24212IRTZ-EVALZ Troubleshooting

1. Verify that a jumper between position 2-3 on JP1 is installed so that writing to the ISL24212 data register and EEPROM is enabled.

2. Verify that the correct voltage is present across the power supply pins and that the board is drawing reasonable current. To verify at A_{VDD} = 18V and V_{DD} = 3.3V, I_{AVDD} is about 4.7mA, and I_{DD} is about 580µA, with default resistor values. These currents scale with resistor values.

3. Probe the R_{SET} node for a small voltage that changes with the register value (1/20 V_{DD} at max code).

4. Probe the DVR_OUT node and verify that, when power is applied and nothing is connected to the output, the same voltage is detected at the OUTPUT (V_{COM}) node.

5. Verify that when the **CTL High/Vcom Up** button on the evaluation board is pressed, the voltage at the CTL line goes from VDD/2 to VDD and then back down to VDD/2.

6. Similarly, verify that when the **CTL Low/Vcom Down** button is pressed, the voltage at the CTL line goes from VDD/2 to GND and then back up to VDD/2.

Evaluation Software Troubleshooting

When trying to run the ISL24212 evaluation software, the occurrence of error number 429 (Figure 12) means that your computer does not have a sufficiently updated copy of Microsoft.NET Framework installed.

FIGURE 12. RUN-TIME ERROR 429

Microsoft.NET Framework can be downloaded from the Microsoft web site at:

http://www.microsoft.com/net/download.aspx

Any version from 2.0 and higher will work.

For information regarding Intersil Corporation and its products, see www.intersil.com

ISL24212IRTZ-EVALZ Board Schematic

These components only used for device evaluation via the USB interface, they are not used in normal ISL24212 applications.

Vcom Calibrator Circuit

Note 2:

EEPROM Programming
Controlled by USB
Module
JP1: 1-2 Installed.

EEPROM Programming
Button Enabled :
JP1: 2-3 Installed.

EEPROM Programming
Disabled :
JP1: Removed.

Note 1:
Diodes D1, D2 and D3 and Fuses F1
and F2 are for eval board protection.
They are not required for customer
designs.