

# ISL24211IRTZ-EVALZ Evaluation Board User Guide

## Description

The ISL24211IRTZ-EVALZ evaluation board is designed to allow evaluation of the ISL24211 V<sub>COM</sub> Calibrator, as well as to provide the optional configuration hardware to integrate the ISL24211 into an existing application for evaluation purposes (see the [ISL24211](#) datasheet for more details).

The evaluation board comes with the ISLUSBCEVAL1Z-REV.A module (Figure 1). This module allows the user to access the ISL24211 onboard I<sup>2</sup>C interface, which is the only way to read and write to the device.

## Initial Set-Up

This application note describes how to set up and use the ISL24211IRTZ-EVALZ evaluation board in a standalone configuration. It explains how to install the software and how to use the Windows interface to read and write to the ISL24211 data register and EEPROM.

## Power Connections

The power pins are located on the top edge of the evaluation board. The part operates with an analog supply voltage (AV<sub>DD</sub>) of 4.5V to 19V, but EEPROM writing can only be done with analog supplies greater than 10.8V. The digital supply voltage (V<sub>DD</sub>) range is 2.25V to 3.6V.

## Write Protect

JP1 is located to the right of the USB module (Figure 1) and is responsible for controlling the voltage at the active low Write Protect pin (Pin 4). When the jumper is installed, WP is connected to V<sub>DD</sub>, enabling register adjustment and EEPROM programming. By removing the jumper, the ISL24211 internal pull-down pulls  $\overline{WP}$  low, disabling the chip's ability to write to both the register and EEPROM. However, the chip will continue to acknowledge transfers and will perform reads from the data register while in the write-protected state.

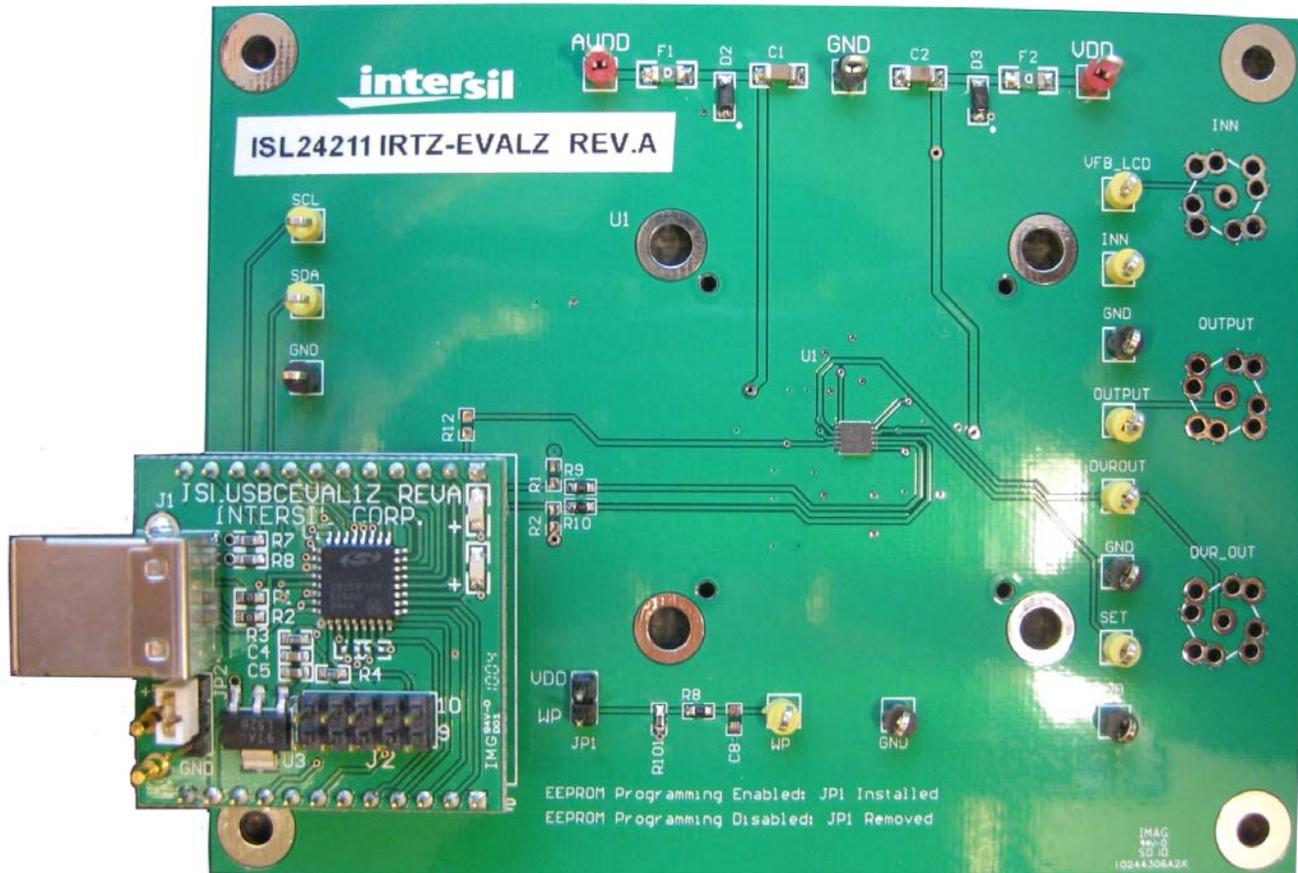


FIGURE 1. ISL24211IRTZ-EVALZ EVALUATION BOARD WITH ISLUSBCEVAL1Z-REV.A MODULE

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## Test Connections

Probe points across the evaluation board simplify monitoring of the ISL24211 voltages and functionality (Figure 2). These include the voltage at the  $R_{SET}$ , INN, DVR\_OUT,  $\overline{WP}$  and I<sup>2</sup>C pins. While the output amplifier is usually operated in the unity gain configuration, an optional VFB\_LCD connection allows the introduction of a feedback signal from the LCD panel to the negative amplifier terminal. This is useful in some applications.

## Output Connections

The buffered  $V_{COM}$  voltage is presented at the OUTPUT node, which is accessible through the test pin or by soldering on an optional BNC or SMA jack.

## Evaluation Software

The next section explains how to install the graphical user interface (GUI) software, which is used to configure the ISL24211 data register.

## Notes

The GUI software was developed on a 32-bit Windows XP platform. Because the GUI software registers as a Human Interface Device (HID) and uses standard HID calls, it should also

work on other XP or later Windows operating systems (32-bit and 64-bit), including Windows 7.

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 ISL24211IRTZ-EVALZ software can be installed from the CD-ROM that accompanies the evaluation board or from an installer file downloaded from the [ISL24211 device information page](#) on the Intersil web site.

Launch the "ISL24211 Installer v1.1.exe" file and follow the instructions (Figure 3). The default installation adds an "Intersil" directory to the "Start Menu\Programs" tree. That directory will contain a shortcut to the ISL24211 executable, and an uninstaller.

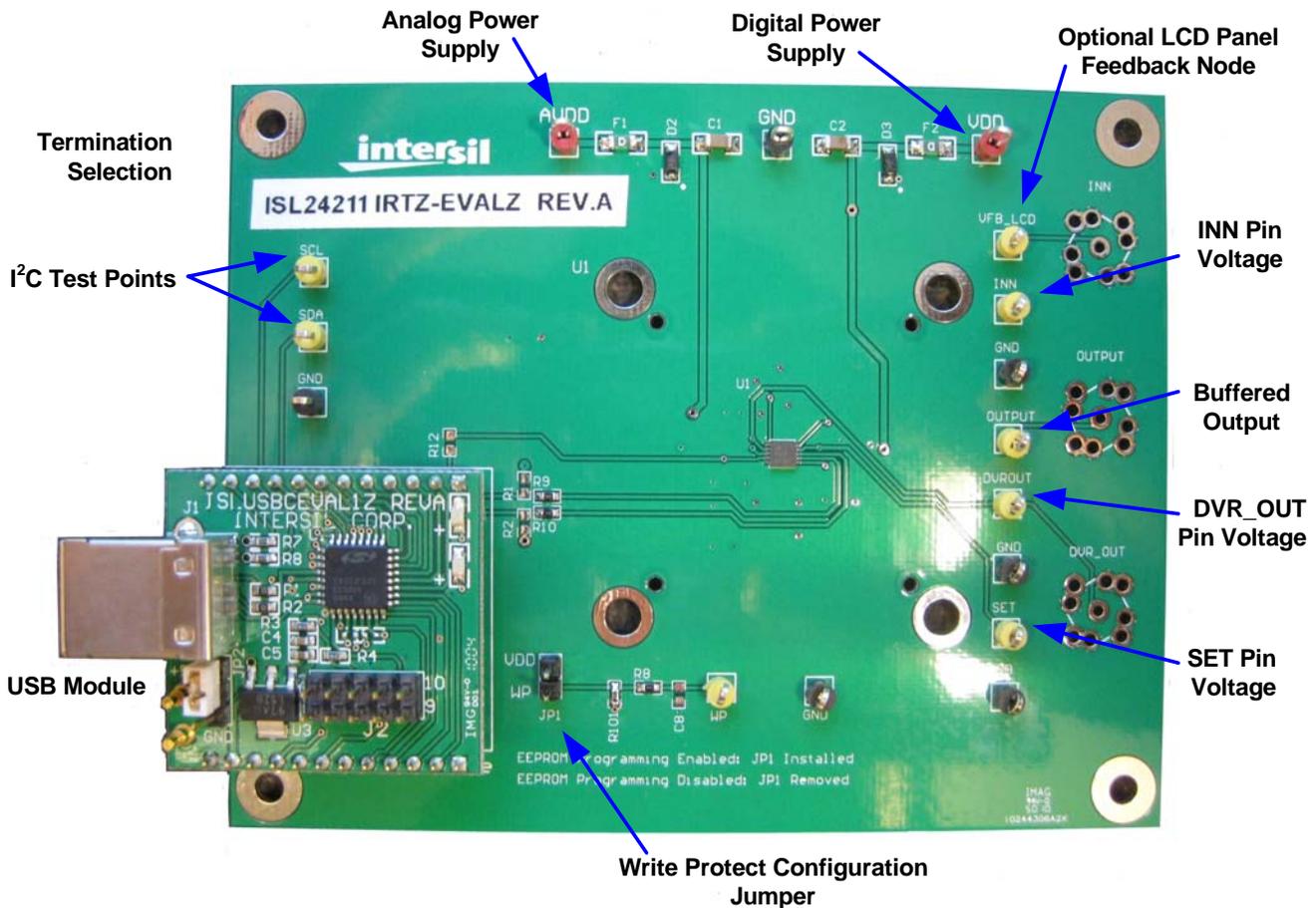


FIGURE 2. EXTERNAL CONNECTIONS AND JUMPERS

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The default install option places the main program files in the C:\Program Files\Intersil\ISL24211 directory; however, the location can be customized, if desired.



FIGURE 3. INSTALLER WINDOW

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

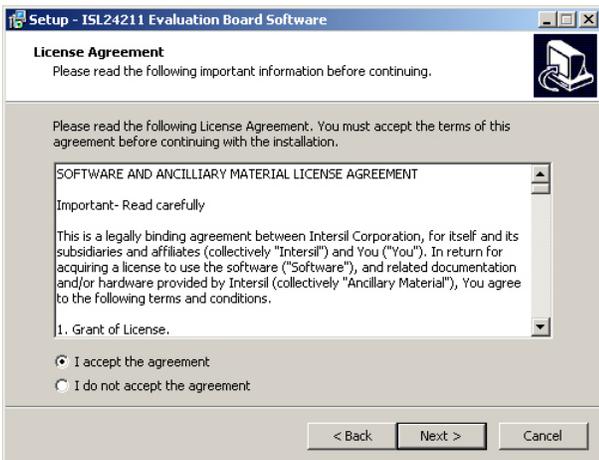


FIGURE 4. LICENSE AGREEMENT

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

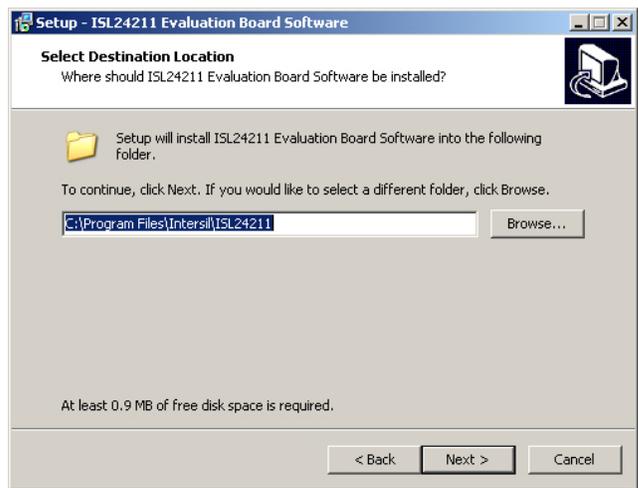


FIGURE 5. SELECT DESTINATION LOCATION

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).

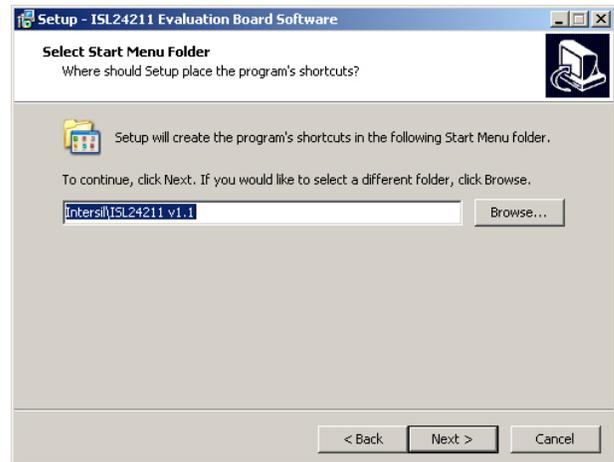


FIGURE 6. SELECT START MENU FOLDER

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

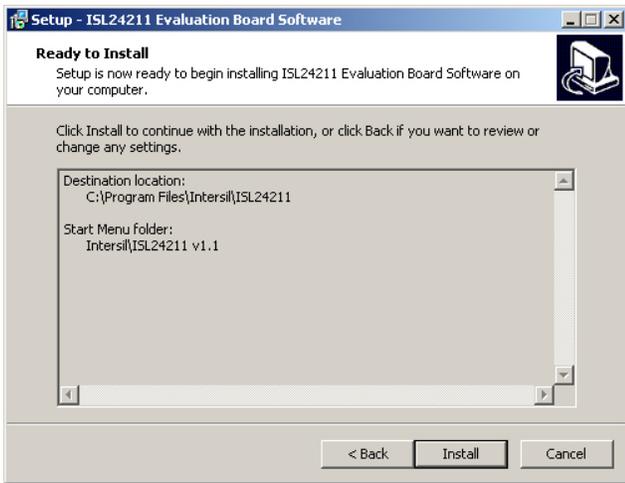


FIGURE 7. BEGIN INSTALLATION

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

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

## Hardware Setup

After the software is installed, the evaluation board is ready to be interfaced through the PC.

1. Verify that JP1 is shorted if you wish to use the USB module to adjust the ISL24211 register or EEPROM.
2. Connect the power supply ground(s) to the GND post.
3. Apply the analog supply (4.5 to 19V) to the AV<sub>DD</sub> post.
4. Apply digital supply (2.25 to 3.6V) to the V<sub>DD</sub> post.
5. Connect the evaluation board to the PC with a USB cable.

## USB Module Installation

When the ISLUSBCEVAL1Z-REV.A USB module is initially connected to the PC, Windows XP may display the **Found New Hardware** pop-up message (Figure 8).



FIGURE 8. FOUND NEW HARDWARE

This message means the USB module is registering itself as an HID on your computer. The process should complete within a few seconds.

On XP systems, a pop-up message may appear, displaying the status of the USB module hardware (Figure 9).

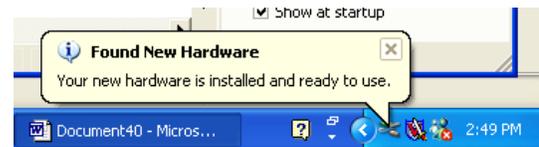


FIGURE 9. HARDWARE INSTALLED NOTIFICATION

If a **Found New Hardware** window appears asking for the location of device drivers, please contact Intersil for a new USB module.

## Using the Software

Launch the software from the default location:

Start Menu\Programs\Intersil\ISL24211

After the program launches, you should see the screen shown in Figure 10. The window is divided into three parts. From left to right are the DVR/EEPROM configuration section, the Calculator section, and the simplified schematic, which is provided for reference.

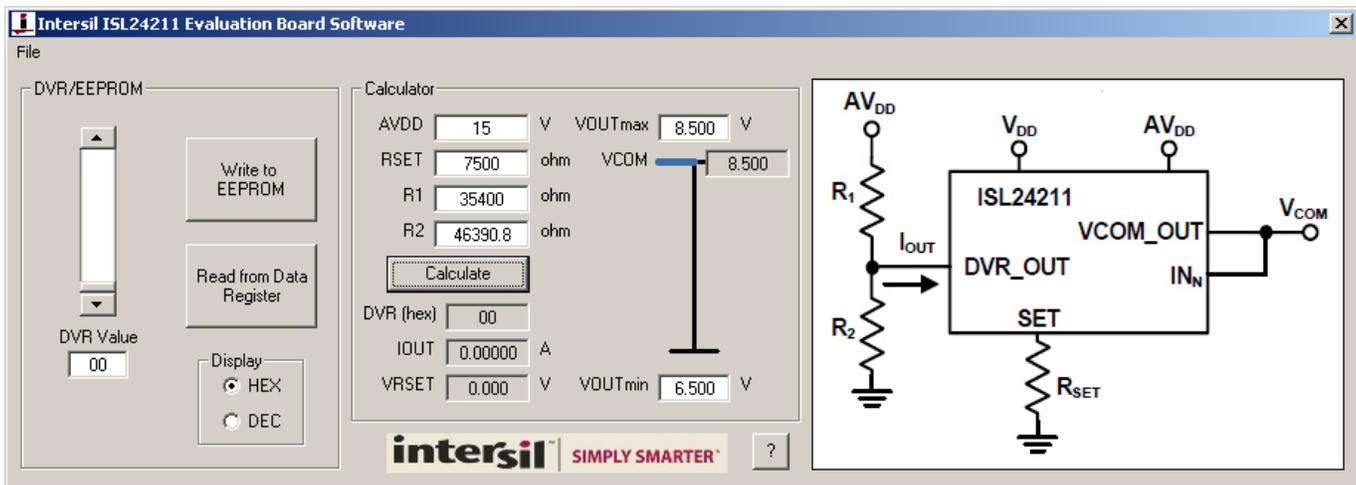


FIGURE 10. EVALUATION SOFTWARE WINDOW

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## ISL24211 Calculator

Use the calculator (Figure 11) 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 11. CALCULATOR PANEL

Note that when the **AVDD** and **RSET** fields are clicked, the dialog shown in Figure 12 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.

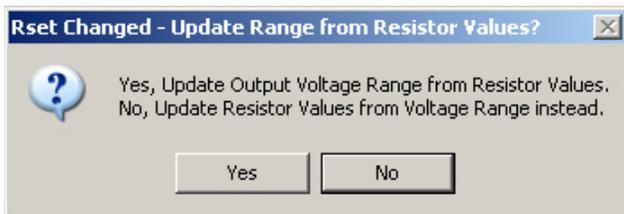


FIGURE 12. UPDATE CONFIRMATION

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

1. Enter preliminary  $AV_{DD}$  and  $R_{SET}$  values.
2. Enter existing R1 and R2 values.
3. Read off resulting output voltage range ( $V_{OUTmax}$  and  $V_{OUTmin}$ ).
4. Adjust  $R_{SET}$  and  $AV_{DD}$  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  $AV_{DD}$  and  $R_{SET}$  values.
2. Enter desired output voltage values (in appropriate order so  $V_{OUTmin}$  does not exceed  $V_{OUTmax}$ ).
3. Read off resulting R1 and R2 values.

4. Adjust  $R_{SET}$  and  $AV_{DD}$  values for reasonable resistor values (click **No** to select “No, Update Resistor Values from Voltage Range instead.”).

## ISL24211 DVR Adjustment Function

The left-most DVR/EEPROM section of the software window (Figure 13) allows the user to directly read and modify the contents of the ISL24211 data register.

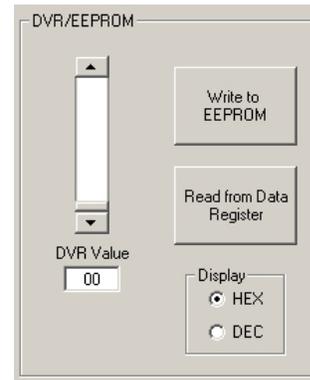


FIGURE 13. DVR/EEPROM OPERATIONS

To change a register value, type the desired hexadecimal number into the **DVR Value** box. For decimal input, select the **DEC** radio button in the **Display** area. The software adjusts numbers that exceed the range of 0-255 or 0-FF hex to the nearest valid value.

After entering the number, the **Press ENTER to Send** reminder appears (Figure 14). Press the Enter key on your keyboard to send the new value to the ISL24211IRTZ-EVALZ evaluation board. This feature allows you to step the output deterministically.

The register value can be incremented and decremented 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 using 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.

## ISL24211 EEPROM Operations

When the register value is changed by the user, the **Write to EEPROM** button flashes yellow as a reminder that the current value in the ISL24211 data register is not the same as the value in the EEPROM that will be read at start-up (Figure 14).

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When the desired register value is achieved and is ready to be stored in the EEPROM, click **Write to EEPROM**. For these operations to be successful, it is important that JP1 controlling the active low WP pin is tied high and that  $AV_{DD} > 10.8V$ .

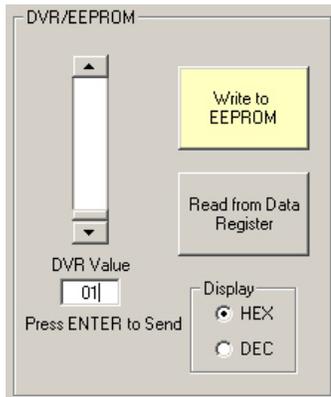


FIGURE 14. EEPROM PROGRAMMING

After you click **Write to EEPROM**, the programming operation can be verified by power-cycling the part and clicking **Read from Data Register**. If the written value is read back upon power-up, the EEPROM was successfully programmed.

## Related Documents

- [ISL24211](#) datasheet

## Troubleshooting

### ISL24211 Troubleshooting

1. Verify that JP1 is installed so that writing to the ISL24211 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  $AV_{DD} = 18V$  and  $V_{DD} = 3.3V$ ,  $I_{AVDD}$  is about 4.7mA, and  $I_{DD}$  is about 580 $\mu A$ , 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 I<sup>2</sup>C signals can be detected on the SDA and SCL pins. If they cannot, check the connection between the evaluation board and the USB module.

### Evaluation Software Troubleshooting

When trying to run the ISL24211 evaluation software, the occurrence of error number 429 (Figure 15) means that your

computer does not have a sufficiently updated copy of Microsoft.NET Framework installed.



FIGURE 15. 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.

### USB Driver Troubleshooting

The evaluation board software should be able to communicate with the evaluation board as soon as it is launched. If there is a communication problem, the dialog box shown in Figure 16 is displayed. Click **Retry** to attempt to reconnect, or click **Cancel** to exit the application.



FIGURE 16. DEVICE NOT CONNECTED

After rebooting the PC, verify that the following files are in the following locations:

- ISL24211.exe in C:\Program Files\Intersil\ISL24211
- isilhid.dll in C:\Program Files\Intersil\ISL24211

If the dialog shown in Figure 16 persists, open the Windows Control Panel. Double-click the **System** icon, select the **Hardware** tab, and then click **Device Manager**. The **Device Manager** window shown in Figure 17 opens.

Click **Human Interface Devices** to expand the folder. You should see **HID-compliant Device** and an extra **USB Human Interface Device** subcategory when the USB module is plugged in. This indicates the driver is properly installed and is communicating with the evaluation board.

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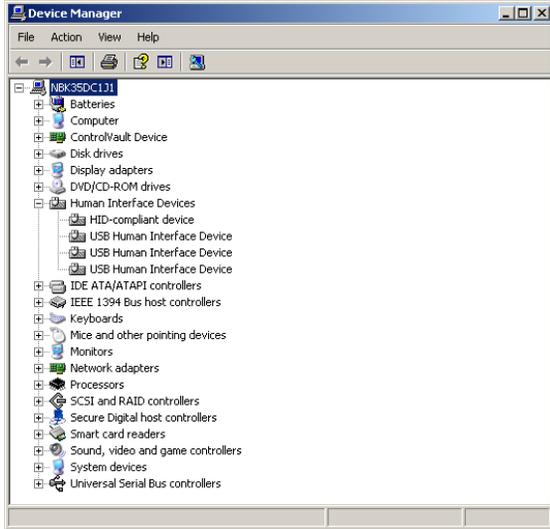


FIGURE 17. DEVICE MANAGER WINDOW

To verify that the new entries are actually the USB module, right-click on **HID-compliant Device** and in the drop-down menu, click **Properties**. The **HID-compliant device Properties** window opens (Figure 18). Click the **Details** tab. In the text window, you should see a string, "HID\VID\_09AA&PID\_2019" corresponding to the Vendor ID and Product ID of the USB module. The Vendor ID = 0x09AA, and the Product ID = 0x2019.

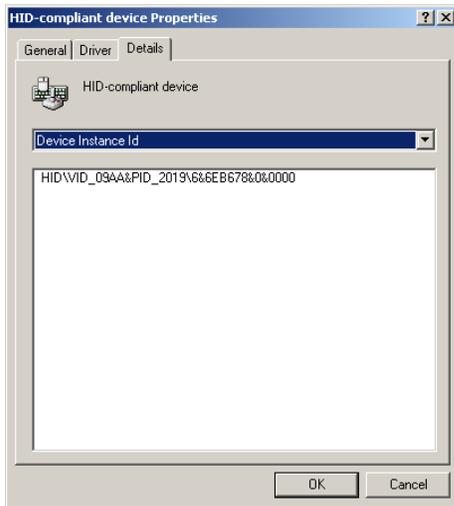


FIGURE 18. VERIFY VID = 09AA AND PID = 2019

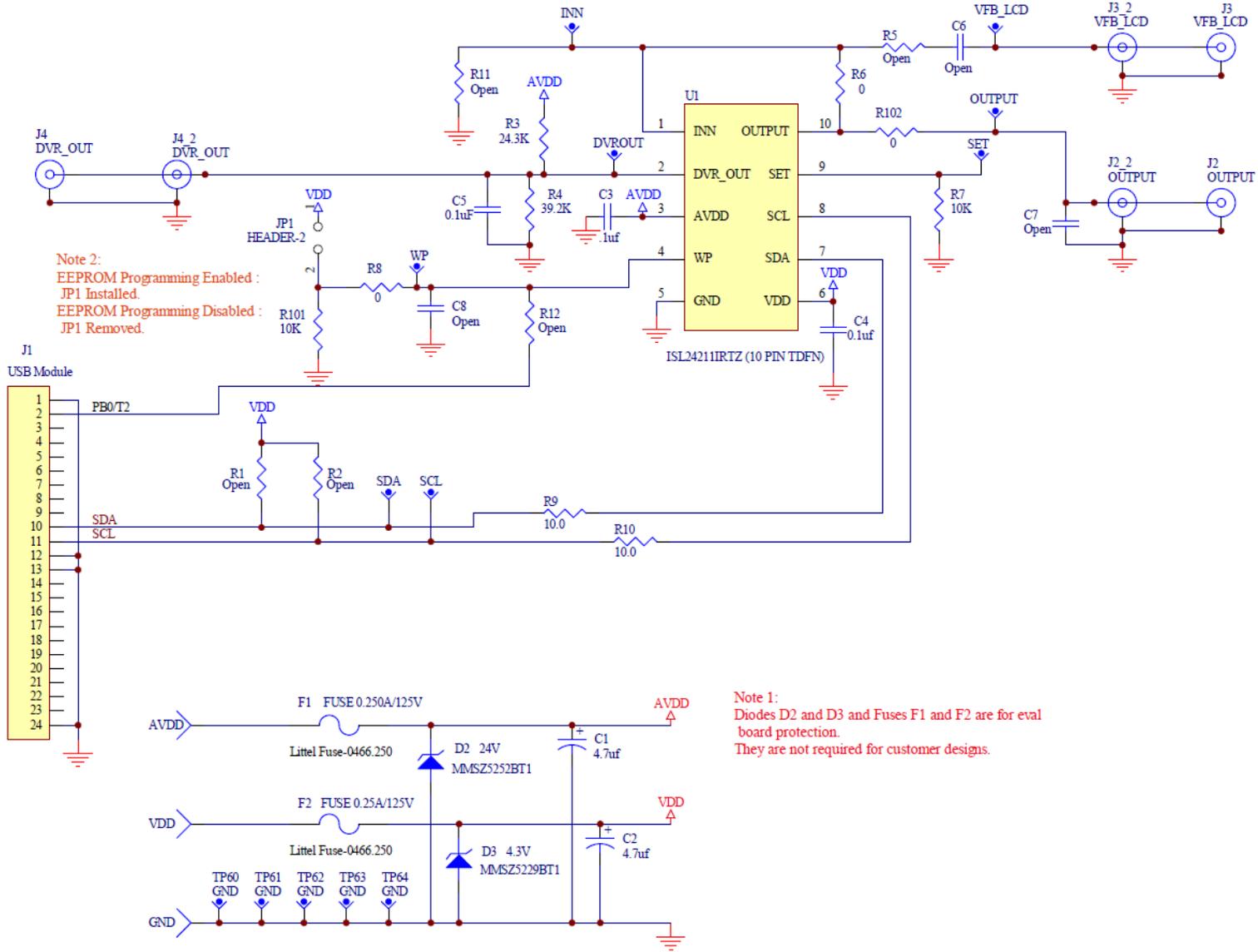
If the Vendor ID and Product ID are not visible, or if there are any error messages, try the following actions:

- Verify that the evaluation board has power and that the USB cable is connecting the evaluation board and the PC.
- Disconnect and then reconnect the USB cable. You should hear two tones from the PC speakers when the USB device is enumerated.
- Cycle the power to the board.
- Close all instances of the ISL24211 application and restart the software. Restart the PC if necessary.
- If none of this works, try installing the software on a different PC to isolate the cause to the PC versus the evaluation board.

Intersil Corporation reserves the right to make changes in circuit design, software and/or specifications at any time without notice. Accordingly, the reader is cautioned to verify that the Application Note or Technical Brief is current before proceeding.

For information regarding Intersil Corporation and its products, see [www.intersil.com](http://www.intersil.com)

# ISL24211IRTZ-EVALZ Board Schematic



Note 2:  
 EEPROM Programming Enabled :  
 JP1 Installed.  
 EEPROM Programming Disabled :  
 JP1 Removed.

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