Description
The ISL76683EVAL1Z evaluation board is an RoHS compliant evaluation board designed for exploring the operation of the ISL76683 light-to-digital output sensor. The evaluation board is an easy-to-use platform for testing most of the specifications and functionalities described in the ISL76683 datasheet.

Evaluation Package
• Demo Board (Evaluation Board ISL76683EVAL1Z and USB Board ISLUSBCEVAL1Z, REV A), populated with all required components
• USB 2.0 Cable
• Evaluation Software (see “Tools and Support” on ISL76683 device information page)
• AN1657: “ISL76683 Light-to-Digital Output Sensor Evaluation Hardware/Software User Guide” (see “Technical Documentation” on ISL76683 device information page)

System Requirements
• Windows 98/NT/2000/XP
• USB Port

Hardware Setup
The PC and printed circuit board (PCB) should not be connected via the USB until after the evaluation software has been installed satisfactorily (see “Software Setup” on page 2).

To set up the hardware:
1. Connect the USB 2.0 cable first to the PC and then to the evaluation board. The USB cable is the only connector needed.
2. If a dialog appears asking about installing software for new-found hardware, click “Yes, this time only”.

The jumpers on the printed circuit board (PCB) are as shown in Table 1.

<table>
<thead>
<tr>
<th>JUMPER</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>J500K</td>
<td>Rext = 500kΩ</td>
</tr>
<tr>
<td>J100K</td>
<td>Rext = 100kΩ (Default)</td>
</tr>
<tr>
<td>J50K</td>
<td>Rext = 50kΩ</td>
</tr>
<tr>
<td>VDD to 3.3V</td>
<td>Connect 3.3V rail to VDD</td>
</tr>
</tbody>
</table>
Software Setup

Downloading the Software

On the ISL76683 device information page, under "Tools and Support", click Intersil_ALS_ISL76683_Installer_V100.exe to download the ISL76683 evaluation software installer file.

Firmware Reference

The installer file has Human Interface Device (HID) firmware in the microcontroller board, ISLUSBCEVAL1Z, REV A. The firmware allows the evaluation software to communicate with the ISL76683 evaluation board through a PC operating on Windows 98/NT/2000/XP.

Installing the Software

Download and run Intersil_ALS_ISL76683_Installer_V100.exe. The dialog shown in Figure 2 appears. Follow the instructions on each screen for installing the software. The PC and PCB should not be connected via the USB until after the installation has completed satisfactorily.
Running the Evaluation Software

To open the evaluation software program:

1. Click the Start menu and navigate to the software as follows:
   Start -> All Programs -> Intersil -> Intersil_ALS_ISL76683 -> Intersil_ALS_ISL76683.
2. Double-click the program name. The Intersil Light Sensor Demo... window shown in Figure 3 appears.
3. In the Device Select dropdown menu, select ISL76683.
4. The ISL76683 Light Sensor Evaluation Software window shown in Figure 4 opens. This window is the main interface for demonstrating the capabilities of ISL76683.

**FIGURE 3. SOFTWARE STARTUP**

**FIGURE 4. ISL76683 LIGHT SENSOR EVALUATION SOFTWARE USER INTERFACE**
Using the ISL76683 Light Sensor Evaluation Software

USB Communications
In the upper left corner of the ISL76683 Light Sensor Evaluation Software window, in the USB Comm area, ensure that the light is green (Figure 5). If it is not green, check the USB cable connection.

Test Communications
In the upper left corner of the ISL76683 Light Sensor Evaluation Software window, in the Device Mode Control dialog area, click the Test Comm radio button to test communications between the PC and the evaluation board. If it shows Good, as shown in Figure 6, then the hardware and software are properly set up. If it shows Fail, check the connections between the PC and the board. If the problem persists, restart the software.

Device Registers
The Device Registers area (Figure 7) in the bottom center of the ISL76683 Light Sensor Evaluation Software window displays the current state of the device registers (Figure 7A). Use the column of buttons to the left of the Collect/Graph Real Time Data grid (top center) (Figure 7B) to read or write to the registers.

Command Register 00 (Hex)

ADC RESET AND DEVICE POWER-DOWN
In the upper left corner of the ISL76683 Light Sensor Evaluation Software window, in the Command Reg - b000 dialog area, click the ADC & Device Power Down check box to disable and reset the ADC and to put the ISL76683 into power-down mode.

MEASUREMENT MODE SELECTION
The ISL76683 contains two photodiodes. Diode 1 is sensitive to both visible and infrared light, while Diode 2 is sensitive mostly to infrared light. Measurement Mode 1 is Diode 1 only, and Measurement Mode 2 is Diode 2 only. Measurement Mode 3 is a sequential Mode 1 and Mode 2, with an internal subtract function (Diode 1 - Diode 2).

You can select the measurement mode in one of two ways. In the upper left corner of the ISL76683 Light Sensor Evaluation Software window, in the Device Mode Control dialog area, click the Measure radio button, and from the scroll list, select the diode to be measured (Figure 9A). Or, in the Command Reg - b000 dialog area, under Measurement, click one of three radio buttons to select the diode to measure (Figure 9B).

AD RESOLUTION
Changing the number of clock cycles does more than just change the resolution of the device; it also changes the integration time, which is the period the device’s analog-to-digital converter (ADC) samples the photodiode current signal for a lux measurement. To change the device resolution (and integration time), in the Command Reg - b000 dialog area, under AD Resolution, click one of the four radio buttons to select the number of clock cycles per conversion.
Control Register 01 (Hex)

RANGE/GAIN SELECTION

The ADC has four I2C programmable range (gain) selections to dynamically accommodate various lighting conditions. For example, a very bright object requires a higher range (e.g., 64k) than a dark object, which requires a low range (e.g., 1k). Higher ranges reduce photo detector sensitivity. In the ISL76683 Light Sensor Evaluation Software window, in the Control Reg - b001 dialog area, under Range, click one of the four radio buttons to select the range to match lighting conditions.

![FIGURE 11. RANGE/GAIN SELECT](image)

Interrupt Control Register 01 (Hex) and Threshold Registers 02 (Hex) and 03 (Hex)

Interrupt thresholds are stored in Registers 0x02 and 0x03. In the Interrupt Control dialog (Figure 12), enter values in the Upper Interrupt Limit R2 and Lower Interrupt Limit R3 text boxes and click Write to edit the interrupt thresholds. (See the ISL76683 datasheet for more information on interrupt limits.) The interrupt thresholds act as an alarm or monitoring function to determine whether the ADC count exceeds the upper or lower limit.

![FIGURE 12. INTERRUPT CONTROL](image)

To set the interrupt limits in the Interrupt Control dialog (see Table 2 for parameter descriptions):

1. Click one of the four radio buttons across the top of the dialog window to choose an interrupt persistence value (recommended value: 8 Trip).
2. Enter decimal values in the Upper Interrupt Limit R2 and Lower Interrupt Limit R3 text boxes. The upper limit must be greater than the lower limit. Values for the limits depend on the application, the configuration of other options, and the distance at which you choose to flag.
3. Click Write and then click Read. Verify the desired limit values by comparing the values entered for the intended limits to the values in the Device Registers dialog after clicking Read. If they do not match, repeat Steps 2 and 3.
4. Click Clear Interrupt to clear or reset the interrupt status bit.
5. You can manually poll the Interrupt pin (Pin 4 on the ISL76683EVAL1Z evaluation board) or you can set it to be polled automatically. To poll it manually, click Sample External Int Pin. To poll it automatically, click the Poll Interrupt check box to select it.

With interrupt limits set, you can begin collecting data. Data is collected within the upper and lower limits you selected. In the Interrupt Control dialog, in the Interrupt Monitor area, black boxes indicate an unflagged status that is within limits. Red boxes indicate the data collected is either above the upper limit or below the lower limit and that the interrupt flag has been triggered.

### TABLE 2. INTERRUPT CONTROL PARAMETERS

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interrupt Persistence</td>
<td>Sets the number of times the upper limit is exceeded or lower limit is succeeded before an alarm or interrupt flag is raised.</td>
</tr>
<tr>
<td>Upper Interrupt Limit R2</td>
<td>Applies to Interrupt Threshold HI Register 0x02. This register sets the HI threshold for the Interrupt pin and the interrupt flag. By default, the interrupt threshold HI is FF (hex). The 8-bit data written to the register represents the upper MSB of a 16-bit value. The LSB is always 00 (hex).</td>
</tr>
<tr>
<td>Lower Interrupt Limit R3</td>
<td>Applies to Interrupt Threshold LO Register 0x03. This register sets the LO threshold for the Interrupt pin and the interrupt flag. By default, the interrupt threshold LO is 00 (hex). The 8-bit data written to the register represents the upper MSB of a 16-bit value. The LSB is always 00 (hex).</td>
</tr>
<tr>
<td>Write, Read</td>
<td>Store or read values in the upper and lower interrupt limit threshold Registers 0x02 and 0x03.</td>
</tr>
<tr>
<td>Clear Interrupt</td>
<td>Click Clear Interrupt to clear or reset the interrupt status bit.</td>
</tr>
<tr>
<td>Sample External Int Pin</td>
<td>Manually sample the external interrupt pin (Pin 4) on the IC.</td>
</tr>
<tr>
<td>Poll Interrupt</td>
<td>Allows checking of the external interrupt status while sampling data.</td>
</tr>
</tbody>
</table>
| Interrupt Monitor          | • Square indicator light displays status: black means no fault; red means an interrupt fault.  
• Monitor external interrupt pin manually by clicking Sample External Int Pin button or automatically by clicking Poll Interrupt check box to select it. Reg b001, Bit h20, can only be monitored manually. |
**Data Collection**

In the ISL76683 Light Sensor Evaluation Software window, use the Collect/Graph Real Time Data dialog (Figure 13) to acquire and graph measurements.

- Click Collect/Graph Real Time Data to sample data. Samples are taken and plotted, and values are displayed in the Reading field on the right side of the dialog. The Reading field displays the value of the ADC output coming out of the sensor in accordance with the mode that is engaged.

- Click Stop Data Acquisition to stop data sampling.

- Click Exit to close the entire program.

- In the Scale Max text box, enter a maximum value for the scale (vertical axis), and click Manual Re-Scale to re-set.

- Click Automatic Re-Scale to re-scale the vertical axis to an appropriate field of view. This feature is useful if the sampled data is out of the range of the graph or if you need to zoom in on the data.

**Saving Measurements to File**

Use the Save Measurements to File dialog box in the lower right corner of the ISL76683 Light Sensor Evaluation Software window to save a series of measurements to disk. Click Browse to enter a filename and select a file path. Click Write to Disk to write the current graph data to disk.

**FIGURE 14. SAVE MEASUREMENTS TO FILE**

**FIGURE 13. GRAPHICAL REAL-TIME DATA COLLECTION**
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