

# Evaluation Hardware/Software Manual for ALS and Proximity Sensors

<http://www.intersil.com/lightsensor/>

## Ambient Light Sensor Products

	ALS	IR	PROXIMITY
<b>ISL29011 FAMILY</b>			
ISL29011 ( <a href="#">Note 2</a> )	X	X	X
ISL29018 ( <a href="#">Note 2</a> )	X	X	X
ISL29021 ( <a href="#">Note 2</a> )		X	X
ISL29023 ( <a href="#">Note 2</a> )	X	X	
ISL29033 ( <a href="#">Note 1</a> )	X	X	
ISL29034/35 ( <a href="#">Note 1</a> )	X		
<b>RGB FAMILY</b>			
ISL29124	X		
ISL29125	X		
<b>ISL29028 FAMILY</b>			
ISL29027			X
ISL29028/ISL29028A	X	X	X
ISL29030/ISL29030A	X	X	X
ISL29040/ISL29042	X	X	X
ISL29044/ISL29044A	X	X	X
ISL29147	X	X	X
<b>STAND ALONE</b>			
ISL29020	X	X	

**NOTES:**

1. ISL29033, ISL29034, ISL29035 does not have once mode.
2. ISL29011, ISL29018, ISL29021 and ISL29023 have once mode; however, Intersil does not recommend to run once mode.
3. ISL29147 uses the ISL29044 evaluation card.

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Evaluation Boards

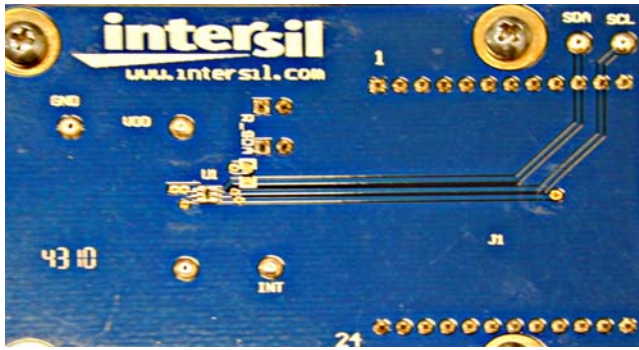


FIGURE 1. ISL29023 EVALUATION BOARD

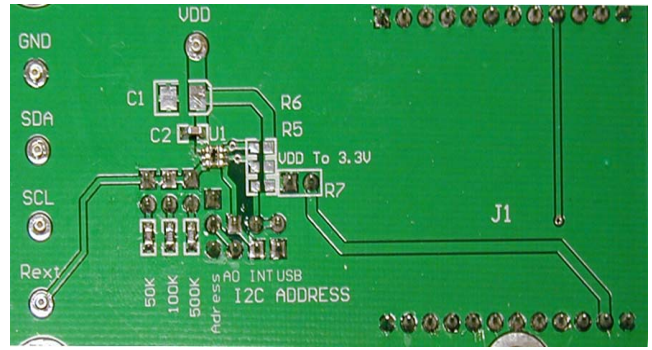


FIGURE 2. ISL29020 EVALUATION BOARD

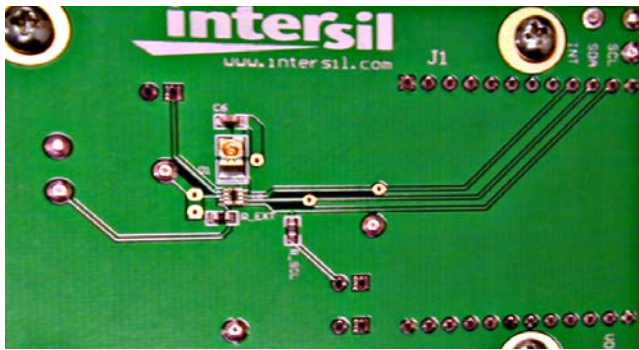


FIGURE 3. ISL29028 EVALUATION BOARD

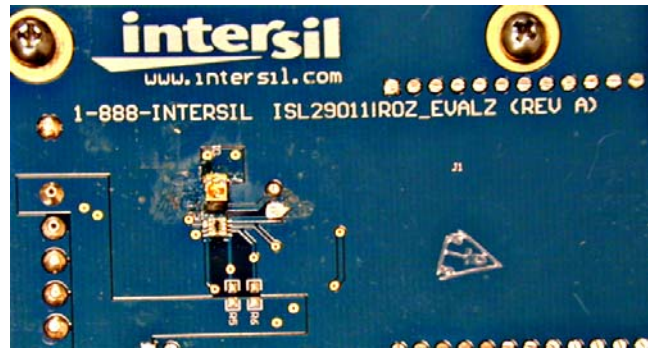


FIGURE 4. ISL29011 EVALUATION BOARD FAMILY

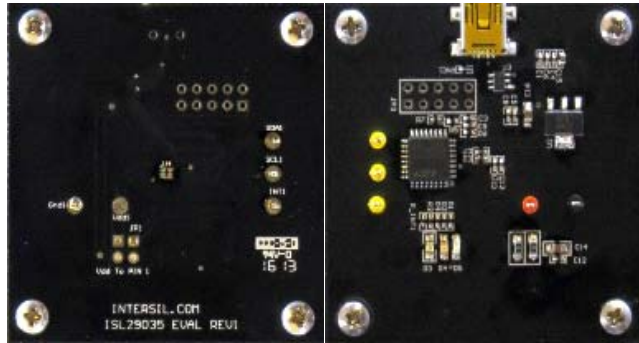


FIGURE 5. ISL29035 EVALUATION BOARD

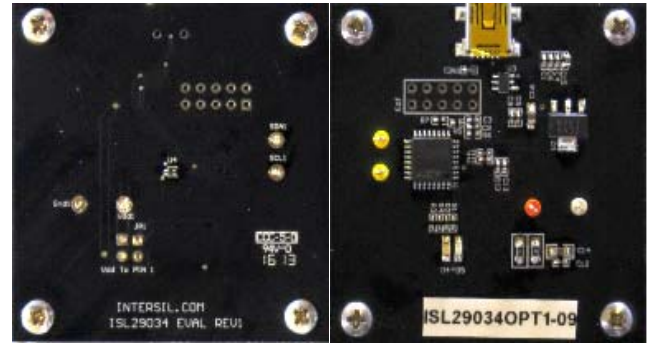


FIGURE 6. ISL29034 EVALUATION BOARD FAMILY



FIGURE 7. ISL29125 EVALUATION BOARD

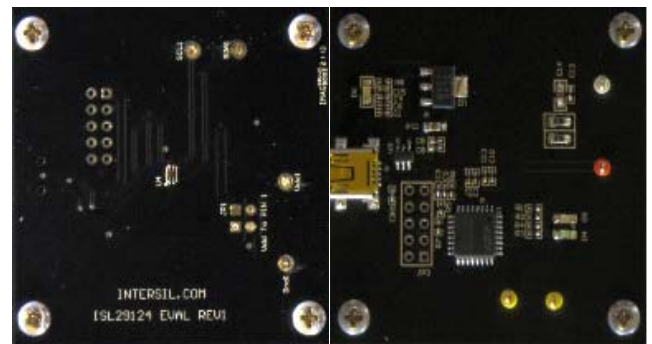


FIGURE 8. ISL29124 EVALUATION BOARD

## Evaluation Boards (Continued)

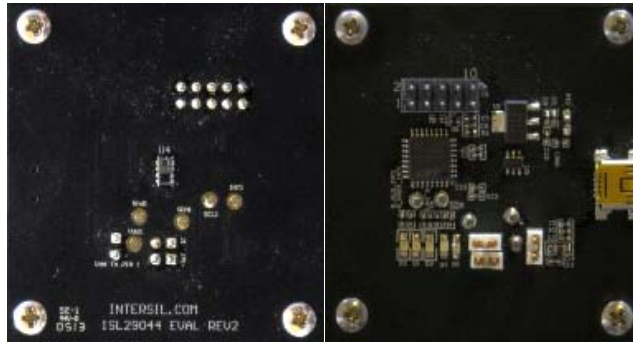


FIGURE 9. ISL29044 EVALUATION BOARD

## Evaluation Package

- Demoboard
- Evaluation software (online)
- USB 2.0 cable

## System Requirements

- Windows 98/NT/2000/XP/VISTA/WIN7/WIN8
- Available USB port

## Software Installation

- [Intersil ISL29xxx HID Installer v1.3.7](#)  
or:
- [intersil\\_ISL29011, ISL29018, ISL29021, ISL29023 Evaluation Board Software v1.0.7](#)

## Firmware Reference

- [Intersil\\_ISL29xxx\\_HID\(V137\).exe](#), which has human interface device firmware in the microcontroller board (**ISLUSBCEVAL1Z-HID\_REV1**). It can therefore communicate with Intersil Ambient Light Sensor products using a PC operating on Windows 98/NT/2000/XP/VISTA/WIN7/WIN8.
- [ISL29011, ISL29018, ISL29021, ISL29023 Installer V107.exe](#), which has Jungo firmware in the Microcontroller board (**ISLUSBCEVALS1Z-REVA**). It can therefore communicate with Windows 98/NT/2000/XP but **not** VISTA and WIN7.

Note: If you have trouble with firmware, please see "[Hardware Setup ISL29124, ISL29125 Family](#)" on page 12.

## Evaluation Kit Contents

The evaluation kit consists of the hardware, software and documentation listed in the following:

1. Evaluation PCB
2. PDF of board schematic (online)
3. PDF of board layout (online)
4. Evaluation Software Installer (online)
5. Evaluation Board manual (online)

## 6. IC Datasheets (online)

The software and documentation can be found on the following product information pages:

<a href="#">ISL29011</a>	<a href="#">ISL29023</a>	<a href="#">ISL29035</a>
<a href="#">ISL29018</a>	<a href="#">ISL29027</a>	<a href="#">ISL29044A</a>
<a href="#">ISL29020</a>	<a href="#">ISL29028</a>	<a href="#">ISL29124</a>
<a href="#">ISL29021</a>	<a href="#">ISL29030</a>	<a href="#">ISL29125</a>
<a href="#">ISL29147</a>		

## Installing the Software

From the link supplied in the previous section, download and run *Intersil\_ISL29XXX\_HID\_Installer\_V137.exe*. The user will be greeted by the screen shown in [Figure 10](#). Continue through the installer and read the instructions. The PC and PCB should *not* be connected via the USB until after the installation has satisfactorily completed.

- Double-click *Intersil\_ISL290XXX\_HIDV1.07.Installer.exe*

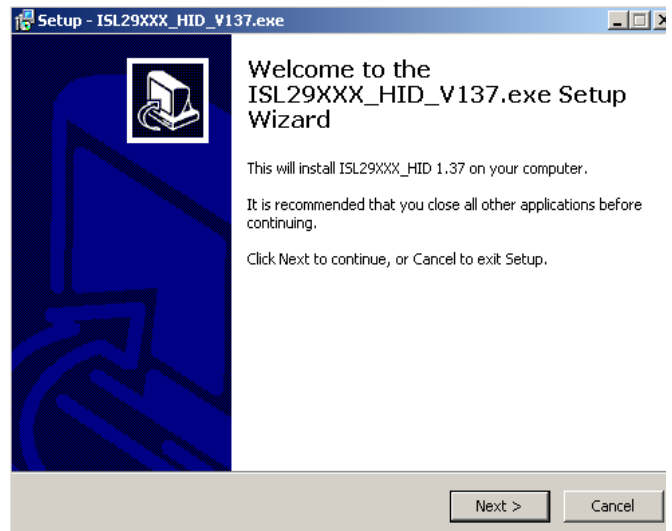


FIGURE 10.

## Hardware Setup for ISL29011 Family

- Connect the USB 2.0 Cable to the PC first and then to the evaluation board.
- The computer may ask about installing software for new found hardware; select “Yes, this time only”.
- On the following screen, it will show how to install hardware. Select the recommended option (Installing from CD) and follow the directions.
- The USB is the only connector needed.

## Running Program for ISL29011 Family

- To open the program, go to the “Start” menu, as shown in [Figure 11](#) (Start →Intersil →Intersil\_29XXX\_HID→ Intersil\_29XXX\_HID)



FIGURE 11.

- Once you have double-clicked the program, the window displayed in [Figure 12](#) should open.

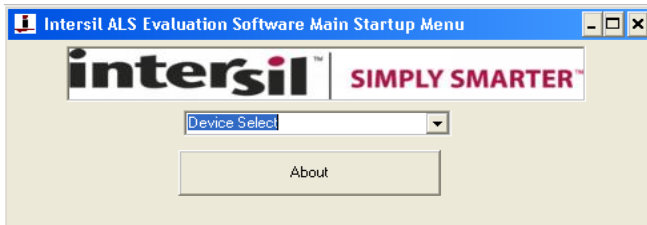


FIGURE 12.

- Go to “Device Select” tab and select the device you have connected to your computer; for this example we will use “ISL29011”, as shown in [Figure 13](#).

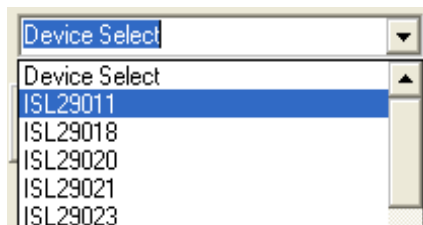


FIGURE 13.

- The “ISL29011 Multifunction Sensor Evaluation Software” window should open.
- This is the main window in which all demonstrations will be done.
- **USB Communication** - Check to make sure the light shown in [Figure 14](#) is green. If it is not green, check your connection.



FIGURE 14.

- **Test Communication** with the IC by clicking the button shown in [Figure 15](#); if it shows “good”, then the hardware and software are properly set up; if it says “fail”, check your connections. If the problem still persists, you may want to restart the software.



FIGURE 15.

Note: This is common for all devices.

- From the menu on the left, choose the specific “**Operation**” in which you would like to operate the IC, as shown in [Figure 16](#). A detailed explanation is described in the datasheet ([ISL29023](#)). [Table 1](#) summarizes the different modes.

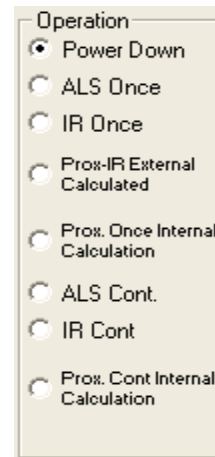


FIGURE 16.

TABLE 1.

MODE	EXPLANATION
Power-down	Turn off and keep data in registers.
ALS Once	Ambient light sense for one conversion then power-down.
IR Once	Infrared sense for one conversion then power-down.
Prox. Once Internal Calc.	Proximity infrared sense for one conversion then power-down; flagging is triggered by Interrupt.
ALS Cont.	Ambient light sense continuously and continue to refresh registers.
IR Cont	Infrared sense continuously and continue to refresh registers.
Prox. Cont Internal	Proximity infrared sense continuously and continue to refresh registers; flagging is triggered by interrupt (Scheme1).
Prox. Cont External	Proximity infrared sense continuously and continue to refresh registers; flagging is triggered by interrupt (Scheme0).

# Application Note 1591

- **Integration Time** in [Figure 17](#) corresponds to the resolution of the internal ADC and the number of bits allocated to representing count. Higher resolution (more bits) requires a large number of counts and will need longer acquisition (integration) time.

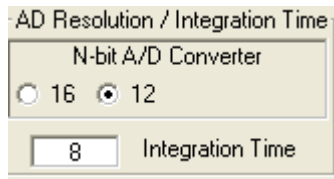


FIGURE 17.

- **Sensitivity-Range Select** in [Figure 18](#) allows us to choose the sensitivity of the sensor based on external conditions/object detection. For example, a really bright object would require a higher range (i.e., 64000), versus a dark object, which would require a low range (i.e., 1000). Higher range reduces photo detector sensitivity.

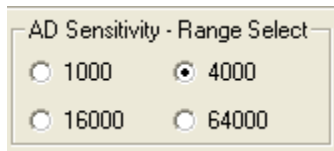


FIGURE 18.

The section shown in [Figure 19](#) allows the user to choose either external proximity or internal proximity calculation.

Scheme0 (external proximity): Not recommended because subtraction is done by the software.

Scheme1 (internal proximity): Recommended because subtraction performed by system on chip.

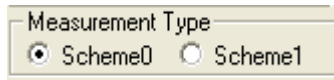


FIGURE 19.

The section shown in [Figure 20](#) is for proximity mode:

**Source Current** allows you to adjust the IR LED driving current. A greater current allows for the detection of objects at farther distances.

**IR Modulation Frequency** allows you to modulate the IR LED driving current. Increasing the frequency parameter allows for better noise immunity.

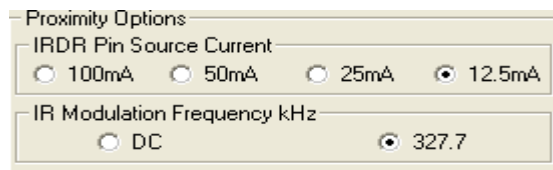


FIGURE 20.

The section shown in [Figure 21](#) displays data of Device Registers:

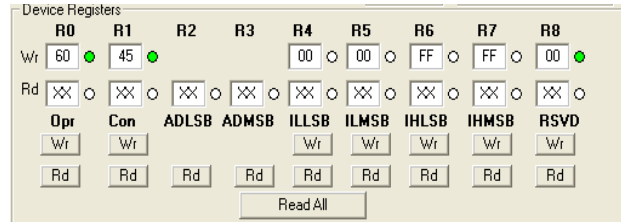


FIGURE 21.

## REGISTER 0X00 – CONFIGURE MODEL

IC register 0x01 controls the modes such as ALS/IR/Prox and Interrupt flag and Interrupt persistence of the part, which are explained in detail in the datasheet.

## REGISTER 0X01 – CONFIGURE MODES II

IC register 0x02 controls the ranges and resolutions of the part and also scheme for proximity.

## REGISTER 0X02 AND 0X03

Data will be stored to these registers.

## REGISTERS 0X03 TO 0X07 – INTERRUPT THRESHOLDS

The PROX interrupt and ALS thresholds are stored in registers 0x03 to 0x07. They can be edited by writing values to the “Interrupt Limits” box and clicking “write”. See the IC data sheet for more information on interrupt limits.

The section shown in [Figure 22](#) allows the user to set the interrupt trip point, which acts as an alarm/monitoring function to determine whether the ADC count exceeds the upper/lower limit.

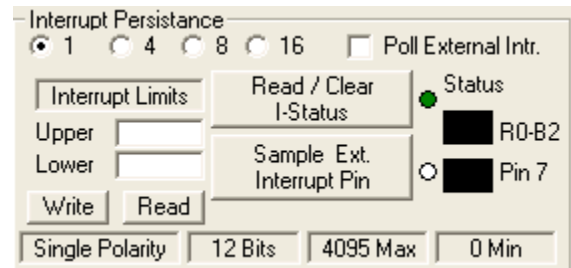


FIGURE 22.

TABLE 2. DEFINITIONS OF TRIP POINT SETTINGS

SETTING	DESCRIPTION
<b>Interrupt Persistence</b>	Sets the number of times the upper limit needs to be exceeded or lower limit needs to be subceeded. Once the allotted number of times is achieved, an alarm/interrupt will flag.
<b>Interrupt Limits</b>	Type the upper threshold for the interrupt in the top box. (Max = 65535 for Interrupt Time = 16; Max = 4095 for Interrupt Time = 12) Type the lower threshold for the interrupt in the bottom box. (Min = 0, for either Interrupt Time)
<b>Write</b>	Stores value to memory in Registers 4 through 7.

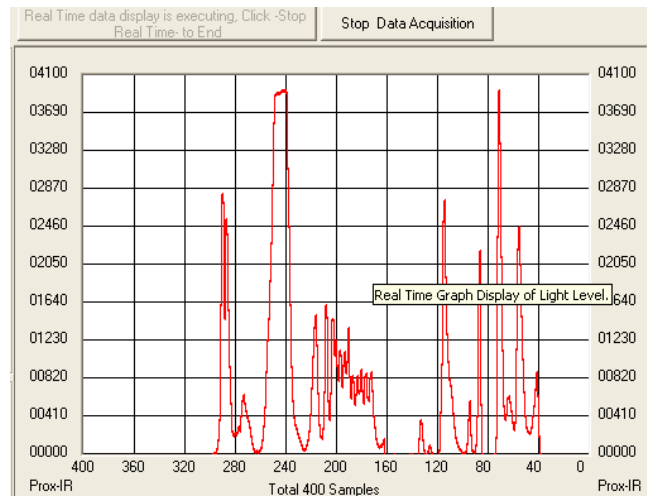
# Application Note 1591

**TABLE 2. DEFINITIONS OF TRIP POINT SETTINGS (Continued)**

SETTING	DESCRIPTION
<b>Read</b>	Read limit values stored in Registers 4 through 7.
<b>Read/Clear I-Status</b>	Checks the 2 <sup>nd</sup> bit of Register 0 to determine Interrupt status, whether interrupt thresholds have been triggered or not. It then displays the results in the "Status" section. The R0-B2 box displays the status of the interrupt. To clear the interrupt status, click 2 times on "Read/Clear" button. - Green light means the button is on and value from Bit 2 from R0 has been read. - Square light displays status; if black then interrupt is off/not triggered yet; if red then interrupt has been triggered.
<b>Sample Ext. Interrupt Pin</b>	Samples the external pin 7 on package of the IC - Green light means, button is on and is displaying output of Interrupt pin 7. - Square light displays the status; black means trigger hasn't been triggered yet. - Red means interrupt has just been triggered.
<b>Poll External Intr.</b>	Allows for checking of external interrupt status while sampling data.

To set-up the interrupt, follow the procedure described below:

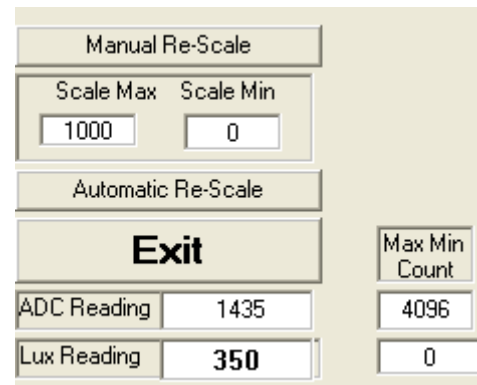
1. Choose Interrupt Persistence value (we recommend 8).
  2. Enter a decimal number for the Upper Limit. Enter a decimal number for the Lower Limit.
  3. The upper limit must be greater than the lower limit. The values for the limits depend on the application, the configuration of other options and the distance at which you choose to flag.
  4. Click on "Write" and then click on "Read" and verify that the desired limit values are correct (verify that the values entered for intended limits are the same values in the field box after clicking on "Read"). If not, repeat steps 2 and 3.
  5. Double click "Read/Clear I-Status" to clear status.
  6. Now you may choose to manually poll the Interrupt pin (pin 7 on package) or for it to happen automatically. To do it manually, simply click on "Sample Ext. Interrupt Pin" when desired. To do it automatically, ensure that the "Poll External Intr." box is selected.
  7. Interrupt is set up now and you may begin collecting data. Data is collected within the upper limit and lower limit. The black box means unflagged status. On the other hand, if the data is collected either above the upper limit or the lower of the lower limit, then the black box will be red, which means the flag has been triggered.
- **Collect Data Graphical Real Time Data** allows you to sample data (whether ALScont, IRcont, ALS Once or IR Once). Samples are now being taken and are being plotted and appropriate values are displayed on the right in the corresponding box.
    - **"Stop Data Acquisition"** stops sampling of data.



**FIGURE 23.**

Here the scale can be adjusted to meet your sampling needs. **"Manual Re-Scale"** allows you to type in the maximum and minimum values for the scale (vertical axis) in the appropriate boxes. The **"Automatic Re-Scale"** button is useful if the sampled data is out of the range of the graph or you need to zoom-in on data. It will rescale the vertical axis to an appropriate field of view.

- **Exit** - this button closes the entire program.
- The value in the **"ADC Reading"** and/or **"Lux Reading"** fields are the appropriate output coming out of the sensor according to which mode is engaged (Figure 24).
- **Max Min Count** - This is the maximum value that can be measured based on the resolution chosen (Integration Time). Max count increases with more integration time.



**FIGURE 24.**

## Saving Measurements to File

To save a series of ALS and PROX measurements to disk, see the "Save Measurements to File" box at the very bottom of the GUI. The user may click "Browse" to select a filename/file path and click "Write to Disk" to write the current graph data to disk.

# Application Note 1591

## Running the Program for ISL29020

To open the program, go to the “Start” menu, as shown in [Figure 25](#).



FIGURE 25.

- (Start → Intersil → Intersil\_29XXX\_HID → Intersil\_29XXX\_HID).
- Once you have double-clicked the program, the window displayed in [Figure 26](#) should open.



FIGURE 26.

- Go to “Device Select” tab and select whichever device you have connected to your computer; for this example we will use “ISL29020”.
- The “ISL29020 Multifunction Sensor Evaluation Software. USB HID Version” window should open the main window in which all demonstrations will be done.

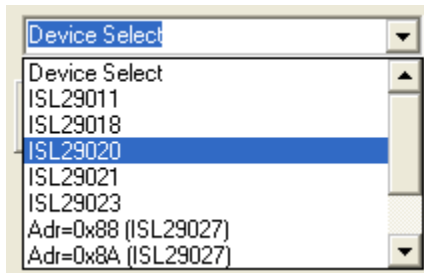


FIGURE 27.

- **USB Communication** - Check to make sure the light shown in [Figure 28](#) is green. If it is not green, check your connection.



FIGURE 28.

- **Test Communication** with the IC by clicking the button shown in [Figure 29](#); if it shows “good”, then the hardware and software are properly set up; if it says “fail”, then check your connections. If the problem still persists, then you may want to restart the software.

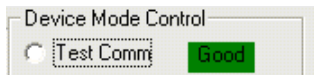


FIGURE 29.

The section shown in [Figure 30](#) allows the ADC-Core to be enabled. The user needs to check “Enable ADC-Core” in order to enable the devices.

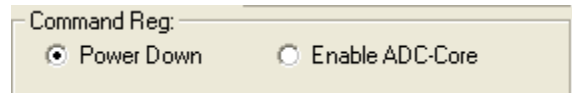


FIGURE 30.

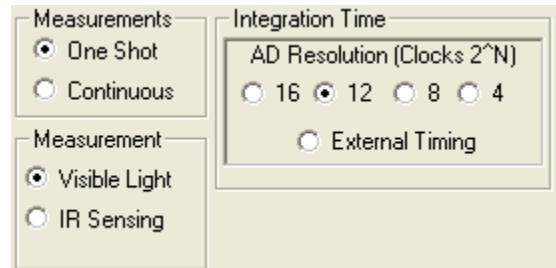


FIGURE 31.

The section shown in [Figure 31](#) allows the user to choose either one shot or continuous measurement for visible or IR sensing and change our ADC resolution for 16-, 12-, 8- or even 4-bit ADC. However, Intersil recommends to run 12-bit ADC or 16-bit ADC for better 50/60Hz reject.

The “External Timing” check box is another option to run when using external customer supplied timing.

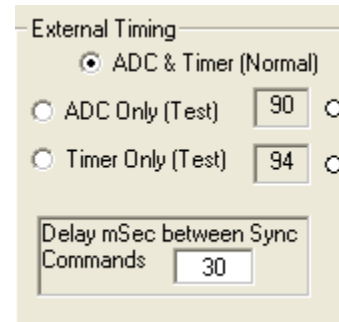


FIGURE 32.

Once the external timing from integration time is selected, [Figure 32](#) will appear. The external timing allows ADC or Timer tests to be read and is able to choose the timing between pulses (~2 pulses). For more information about external timing, refer to the datasheet.

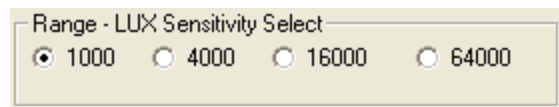


FIGURE 33.

**Range-LUX Sensitivity Select** allows the user to choose the sensitivity of the sensor based on external conditions/object detection. For example, a really bright object would require a higher range (i.e., 64000), versus a dark object, which would require a low range (i.e., 1000). Higher range reduces photo detector sensitivity (see [Figure 33](#)).



# Application Note 1591

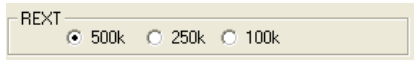


FIGURE 34.

The section shown in [Figure 34](#) allows the user to choose REXT to fix its internal oscillator frequency. 500kΩ is recommended for the devices.

**Collect Data Graphical Real Time Data** ([Figure 35](#)) allows you to sample data (whether ALScont, IRcont, ALS Once or IR Once). Samples are now being taken and are being plotted and appropriate values are displayed on the right in the corresponding box.

- **Stop Data Acquisition** stops sampling of data. Here the scale can be adjusted to meet your sampling needs.
- **Manual Re-Scale** allows you to type in the Maximum and Minimum values for the scale (vertical axis) in the appropriate boxes.
- **Automatic Re-Scale** button is useful if the sampled data is out of the range of the graph or you need to zoom-in on data. It will rescale the vertical axis to an appropriate field of view.
- **Exit** - this button closes the entire program.
- The value in the **“ADC Reading”** and/or **“Lux Reading”** fields are the appropriate output coming out of the sensor according to which Mode is engaged.

## Saving Measurements to File

- To save a series of ALS and PROX measurements to disk, see the **“Save Measurements to File”** box at the very bottom of the GUI. ([Figure 36](#)). The user may click **“Browse”** to select a filename/file path and click **“Write to Disk”** to write the currently graph data to disk

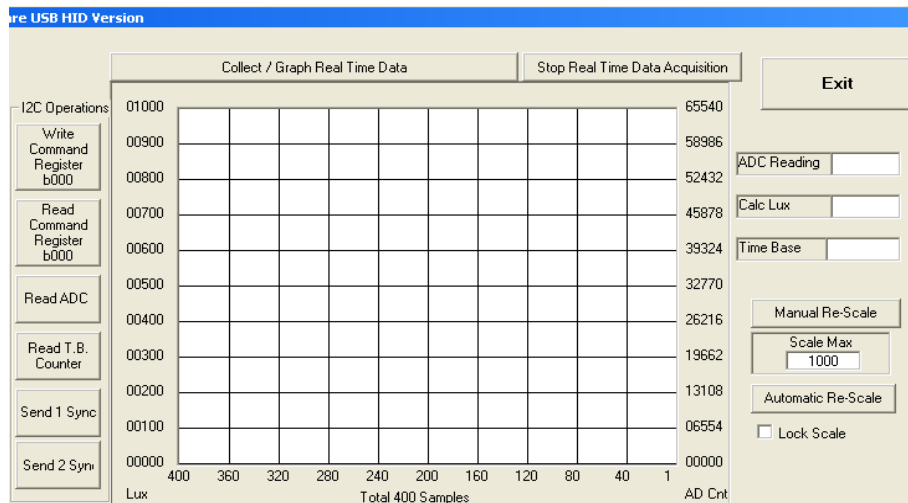


FIGURE 35.



FIGURE 36.

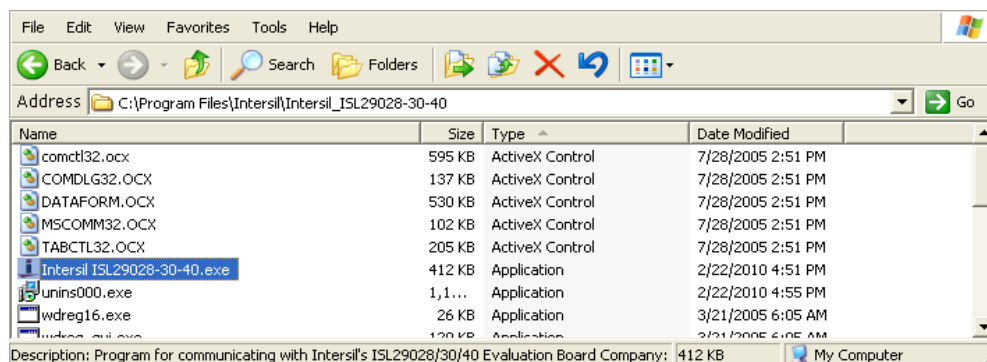


FIGURE 37. LOCATION OF EXECUTABLE ON USER'S HARD DRIVE

## Hardware Setup ISL29028 Family

### Schematic and Layout

The PCB schematic and Layout are contained on the CD-ROM included with this evaluation kit (also see [Figures 49](#) through [56](#)). For help, contact the local Intersil sales/FAE team. (<http://www.intersil.com/cda/Support/contacts/>)

### Connecting the PCB to PC

Insert the USB-B plug into the Intersil evaluation PCB, and the USB-A plug into the user's PC. As seen in [Figure 39](#), the status of the PC->PCB communication link is displayed in the colored box next to "Attached".

### Jumpers on PCB

The "rev B" evaluation board has 4 jumpers, which control various aspects of the part. By default, the jumpers *JP\_IC*, *JP\_MISC*, and *JP\_IRLED* need not be connected due to the 0Ω resistors *R6*, *R7*, and *R8* which connect to a 3.3V rail. If the user desires to test part performance at voltages other than  $V_{DD} = V_{IR-LED} = V_{I2C} = 3.3V$ , unsolder these resistors, use the installed test points and power any of the 3 rails as desired.

TABLE 3. JUMPER OVERVIEW

DESIGNATOR	FUNCTION
JP_PIN1	ISL29028: Changes I <sup>2</sup> C address. ISL29030: Leave open (see " <a href="#">JP_PIN1</a> " on page 10).
JP_IC	Connects 3.3V rail to VDD.
JP_MISC	Connects 3.3V rail I <sup>2</sup> C pull-up, INT, PIN1.
JP_IRLED	Connects 3.3V rail to the IR-LED D1.

### JP\_PIN1

The jumper *JP\_PIN1* is connected to pin 1 of the ODFN and should be **disconnected** for ISL29030 usage and **will work in either state** for the ISL29028. The ISL29030 has a current source on pin 1. The ISL29028 has an I<sup>2</sup>C address select line tied to pin 1.

### Running the Program for ISL29028 Family

If the user has selected the default installation path, the software will install in the following folder: *C:\Program Files\Intersil\Intersil\_ISL29028-30-40\* as seen in [Figure 37](#).

Double-click the highlighted executable shown in [Figure 37](#) to start the evaluation software. A shortcut to this file is also provided via the Windows Start Menu under *All Programs* → *Intersil* → *Intersil ISL29028-30-40*.

Connect the PC to the evaluation PCB via a USB cable. When this connection is made, the "Attached" box displayed in [Figure 38](#) should turn green.

The ISL29028 has a selectable I<sup>2</sup>C address (see pin *ADDR0*). By changing the input logic signal (via jumper *JP\_PIN1*), the I<sup>2</sup>C address can be set to either 0x88 or 0x8A (see the PCB schematic/IC data sheet for more information). This board is shipped with jumper *JP\_PIN1* removed, so by default the part will respond to I<sup>2</sup>C address 0x88.

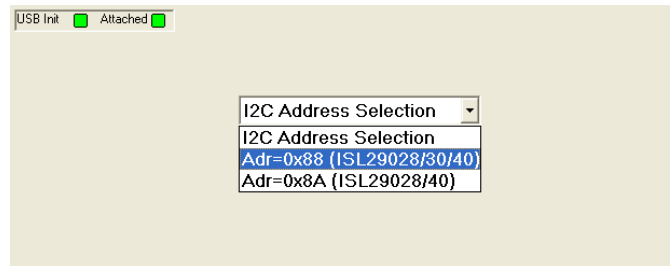


FIGURE 38. SOFTWARE START-UP SCREEN

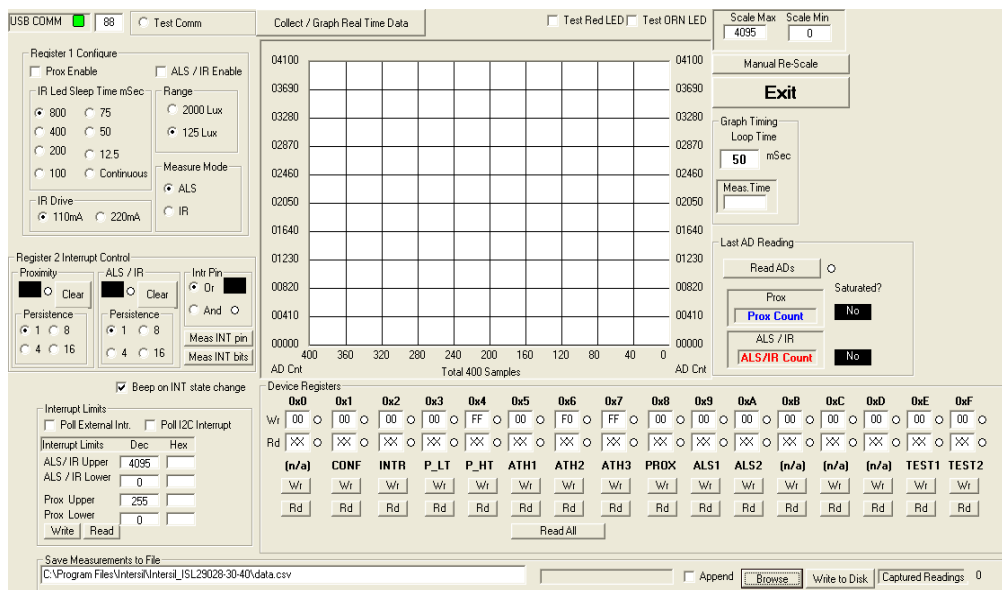


FIGURE 39. SOFTWARE MAIN SCREEN

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## Main Window

The main evaluation software window can be seen in [Figure 39](#).

If the user desires to change the I<sup>2</sup>C address the GUI communicates with, see the upper-left box containing “88” in [Figure 39](#). Change the number as desired and click the “Test Comm” box to test for a valid communication link between the PC and Light Sensor at the specified I<sup>2</sup>C address.

## REGISTER 0X01 – CONFIGURE MODES

IC register 0x01 controls the range and modes of the part. “Sleep time”, “Range” and “Measure Mode” bits are explained in detail in the data sheet. All control bits *not* related to the interrupt function are located in this register.

## REGISTER 0X02 – INTERRUPT BEHAVIOR

IC register 0x02 contains the interrupt flags and controls the interrupt modes. Interrupt persistence and AND/OR (see Bit 0) functionality is contained in this register.

## REGISTERS 0X03 TO 0X07 – INTERRUPT THRESHOLDS

The PROX interrupt thresholds and ALS thresholds are stored in registers 0x03 to 0x07. They can be edited by writing values to the “Interrupt Limits” box and clicking “write”. See the IC datasheet for more information on interrupt limits.

## EXTERNAL INTERRUPT AND INTERRUPT LEDS

To poll the status of the hardware *INT* pin, select the “Poll External Intr” check box and the on-PCB microcontroller will continuously check the logic state of the *INT* line. To poll the status of *ALS\_FLAG* and *PROX\_FLAG* interrupt bits (in register 0x02), select the “Poll I<sup>2</sup>C Interrupt” check box - the GUI will perform an I<sup>2</sup>C read and then instruct the microcontroller to turn

D3/D4 on or off depending on the state of *ALS\_FLAG* and *PROX\_FLAG*.

## COMPLETE REGISTER LISTING

The “Device Registers” box at the bottom of the GUI displays a complete listing of all registers in hex format and should automatically update based on the options selected by the user. Users can individually write to or read from these registers using the “Wr”/“Rd” buttons.

## REAL-TIME DATA ACQUISITION GRAPH

To graphically display the results of ALS and proximity conversions, first click the check boxes “ALS /IR Enable” and “Prox Enable” and select the mode of operation by using the radio buttons in the “Register 1 Configure” area. After this register is configured, click the “Collect Data” button shown in the upper left of [Figure 39](#). Both ALS and Proximity conversions can happen (and are displayed) at once because the ISL29028 architecture has two concurrent ADCs.

## ADC RESOLUTION AND GRAPH RESCALING

Because the ALS conversions are inherently 12-bit ( $2^{12}-1 = 4095$  count maximum), and the proximity conversions are inherently 8-bit ( $2^8-1 = 255$  count maximum), the graph may require rescaling to view both results on the same curve at once. To set a new maximum and minimum graphical scale, change the numbers in the “Scale Max” and “Scale Min” boxes, then click “Manual Re-Scale” (see [Figure 40](#)).

## SAVING MEASUREMENTS TO FILE

To save a series of ALS and PROX measurements to disk, see the “Save Measurements to File” box at the very bottom of the GUI. The user may click “Browse” to select a filename/filepath and click “Write to Disk” to write the currently graphed data to disk.

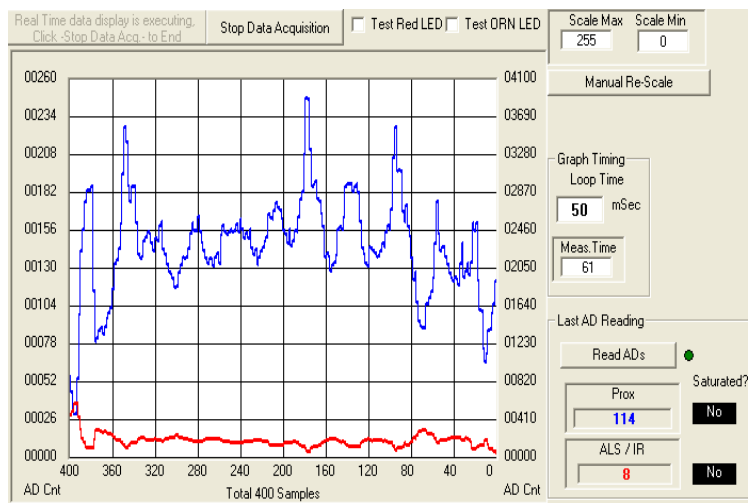


FIGURE 40. REAL-TIME DATA ACQUISITION GRAPH

## Hardware Setup ISL29124, ISL29125 Family

### Schematic and Layout

The PCB schematics are shown in [Figures 49](#) through [56](#) starting on page 15. Contact the local Intersil sales/FAE team, if you need assistance.

(<http://www.intersil.com/cda/Support/contacts/>)

### Connecting the PCB to PC

Insert the mini-USB plug into the Intersil evaluation board, and the USB-B plug into the user's PC, as seen in [Figure 41](#). The green LED at the bottom layer of evaluation is the status of the evaluation board communication link showing it is turned on. Then, the connection between the PC and the evaluation PCB via a USB cable is attached.



FIGURE 41. PC TO EVALUATION BOARD CONNECTION

## Running the Program for ISL29124, ISL29125 Family

If the user has selected the default installation path, the software will install in the following folder: C:\Program Files\Intersil\Intersil\_ISL29XXX\_HID\, as seen in [Figure 42](#).

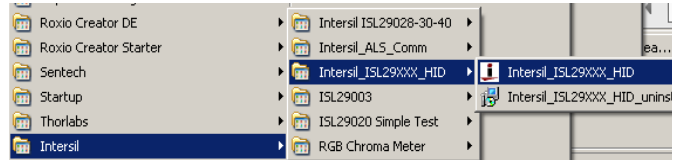


FIGURE 42. SOFTWARE START-UP SCREEN

Double-click the highlighted executable shown in [Figure 43](#), then “Intersil ALS Evaluation Software Main Startup Menu” will display. Click on the drop-down list to select either ISL29124 or ISL29125.

After selecting ISL29125 or ISL29124, “Real Time Data Acquisition Graph” will display shown in [Figure 44](#). Double-click on “USB COM” located on left top corner of “Real Time Data Acquisition Graph”, all registers will display.

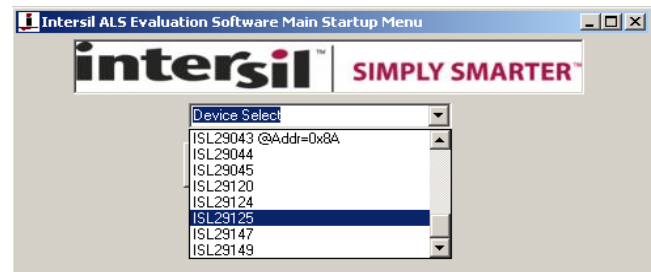


FIGURE 43. SOFTWARE START-UP SCREEN

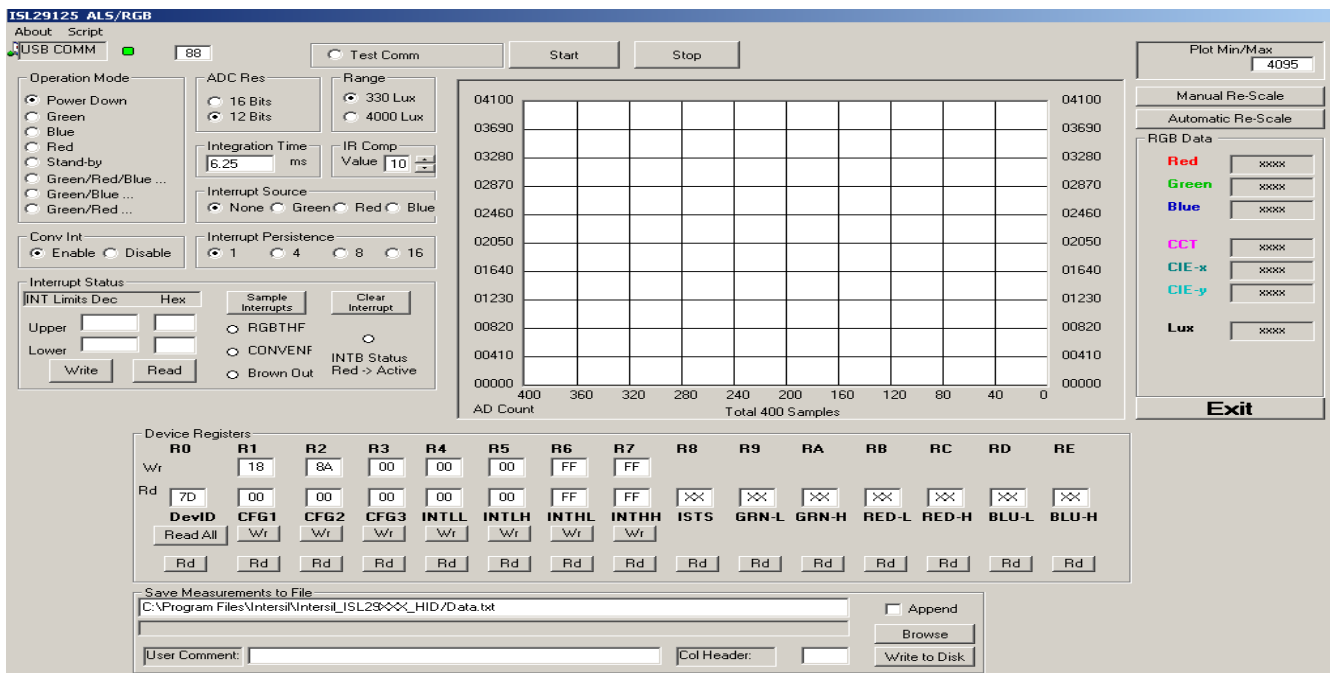


FIGURE 44. SCREEN BEFORE REAL-TIME DATA ACQUISITION GRAPH - ISL29125

# Application Note 1591

## Main Window

The main evaluation software window can be seen in [Figure 44](#). The upper-left box containing “88” is I<sup>2</sup>C slave address. Click the “Test Comm” box to test for a valid communication link between the PC and Light Sensor at the specified I<sup>2</sup>C address.

## REGISTER 0X00 – DEVICE ID

IC register 0x00 is to identify the device in a system. The device register is read only.

## REGISTER 0X01 – CONFIGURATION I REGISTER

IC register 0x01 controls the range and modes, ADC resolution, and SYNC of the part. “Range” and “Measure Mode”, “SYNC”, “ADC Resolution” bits are explained in detail in the datasheet.

## REGISTER 0X02 – CONFIGURATION II REGISTER

IC register 0x02 is designed for operation under dark glass cover, which significantly attenuates visible light and passes the infrared light. This register is explained clearly in the datasheet.

## REGISTER 0X03 – CONFIGURATION III REGISTER

IC register 0x03 contains the interrupt flags and interrupt persist controls modes. Interrupt persistence and “Conversion DONE” bit.

## REGISTERS 0X04 TO 0X07 – INTERRUPT THRESHOLDS

The PROX interrupt thresholds and ALS thresholds are stored in registers 0x04 to 0x07. They can be edited by writing values to the “Interrupt Limits” box and clicking “write”. See the IC datasheet for more information on interrupt limits.

## REGISTERS 0X08– STATUS FLAG REGISTER

This is status flag register such as RGBTHF status for interrupt flags from Register III. CONVENF flag for every complete 100ms conversion for each channel; Brown Out flag indicates the device may possibly have gone through a brownout condition.

## REGISTERS 0X09 TO 0X0E – DATA REGISTERS

The ISL29124, ISL29125 has two 8-bit read-only registers to hold the higher and lower byte of the ADC value. The lower byte and higher bytes are accessed at address respectively. For 16-bit resolution, the data is from D0 to D15; for 12-bit resolution, the data is from D0 to D11. The registers are refreshed after every conversion cycle. The default register value is 0x00 at power-on. Because all the registers are double buffered, the data is always valid on the data registers.

## COMPLETE REGISTER LISTING

The “Device Registers” box at the bottom of the GUI displays a complete listing of all registers in hex format and should automatically update based on the options selected by the user. Users can individually write to or read from these registers using the “Wr”/“Rd” buttons.

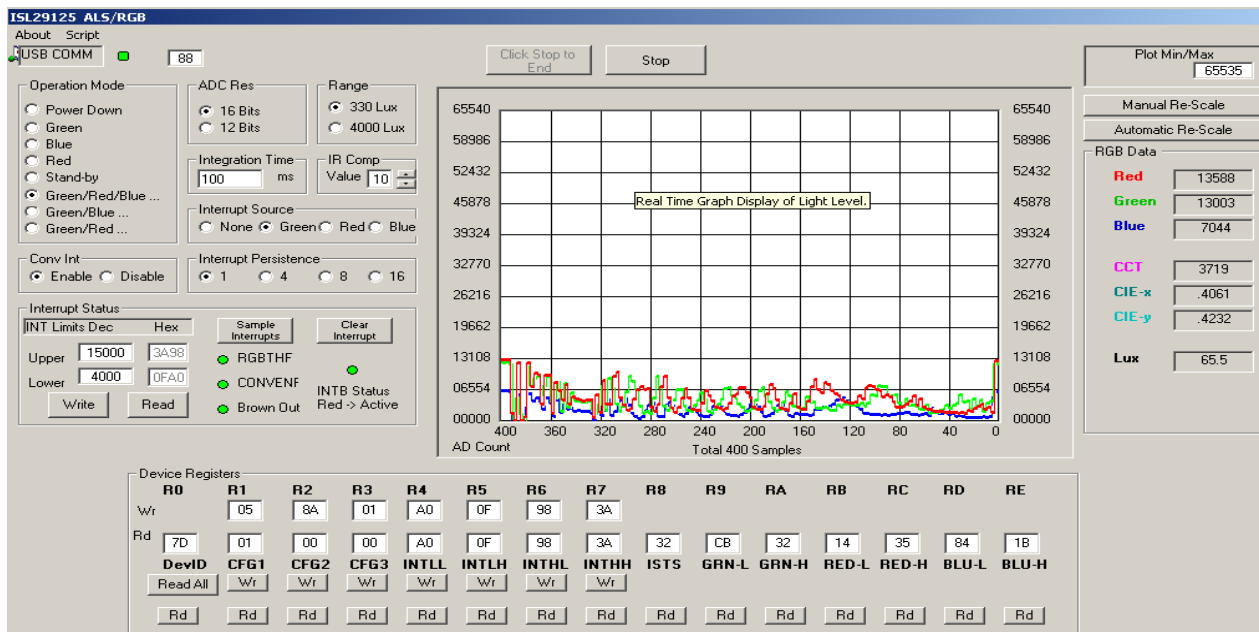


FIGURE 45. REAL-TIME DATA ACQUISITION GRAPH - ISL29125

# Application Note 1591

## REAL-TIME DATA ACQUISITION GRAPH

To graphically display the results of ALS conversions, first select the mode of operation by using the radio buttons in the “Register 1 Configure” area such as GREEN, BLUE, RED or GREEN/RED/BLUE”. Second, select ADC resolution, select the range, and then click radio buttons for interrupt source either GREEN, RED or BLUE. Next, select interrupt persistence, then set the high or low limit at the window “upper” and “lower”, click “write” button to get interrupt trigger. After all these are configured, click the “Start” button shown in the upper-left of [Figure 44](#). GREEN, RED or BLUE conversions can happen (and are displayed) once at every 105ms if the individual channel is selected. GREEN/RED/BLUE conversion can happen (and are displayed) once at every 315ms if GREEN/RED/BLUE is selected. Other options GREEN/RED or GREEN/BLUE can happen (and are displayed) once at every 210ms if GREEN/RED or GREEN/BLUE are selected. “RGB data” block on the right side of [Figure 45](#) displays raw code data for each channel Green, Red and Blue. Additionally, the calculated CTT, CIE-x and CIE-y will show where the RGB sensor (ISL29124, ISL29125) based on the CIE 1931 xy chromaticity space with chromaticities of black-body light sources of various temperatures.

## ADC RESOLUTION AND GRAPH RE-SCALING

Because the ALS conversions are inherently 12-bit ( $2^{12}-1 = 4095$  count maximum) or ( $2^{16}-1 = 65535$  count maximum) the graph may require rescaling to view results every time it is being changed from 12-bit ADC to 16-bit ADC resolution. To set a new maximum and minimum graphical scale, change the numbers in the “Scale Max” and “Scale Min” boxes, then click “Manual Re-Scale” or click on “Automatic Re-scale”.

## SAVING MEASUREMENTS TO FILE

To save a series of GREEN, RED, BLUE or GREEN/RED/BLUE measurements to disk, see the “Save Measurements to File” box at the very bottom of the GUI. The user may click “Browse” to select a filename/filepath and click “Write to Disk” to write the currently graphed data to disk.

## Troubleshooting

- If suffering from poor USB connection, the USB port may need to change.
- If the Proximity sensor is unable to measure anything within a certain distance, the sensor has saturated and the Selectivity parameter needs to be increased.
- If the program says connection fail and the sensor instantly stops working, then simply unplug it from the computer and plug it back in. If the problem still persists, unplug, close the program, plug it back in, and reopen the program.
- If, during a measurement, the program crashes or instantly the Evaluation board is no longer detected as being connected, then unplug and plug back in.
- If too much noise is being picked up, increase the Frequency parameter.
- If you require better detection of far distances, increasing the current parameter will help.

- Also recall that since this is an optoelectrical part with a clear package, performance may be sensitive to aggressive scratching or damaging.
- If the message “Please check USB connection” appears right after trying to run the program, you have an older version of the software GUI or the USB is not connected to the PC. Go back and check the micro-controller board to see if it is marked “HID” version or not. If not, you have the “Jungle” version.

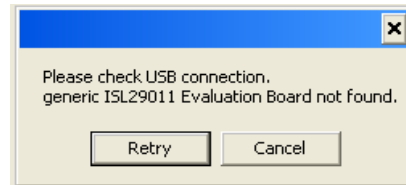


FIGURE 46.

- If you have WIN7 installed on your PC and you are trying to run an Intersil Program, you will get the message shown in the following.

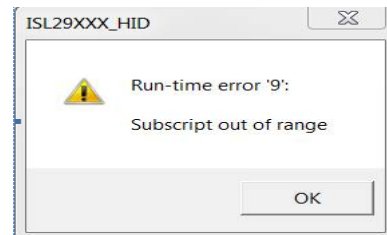


FIGURE 47.

- The screen shown in [Figure 48](#) may be caused by the PC monitor. The solution is to resize the set custom text size (DPI) by going to Control Panel -> Appearance and Personalization -> Display -> Set custom text size (DPI) and choose “Scale to this percentage of normal size: 100%” (96pixels/inch).

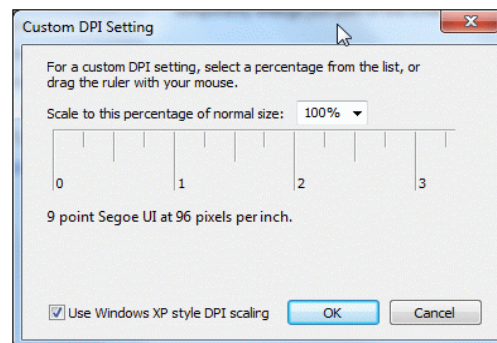


FIGURE 48.

For other questions, comments, and feedback, contact the local Intersil FAE/Sales team.

<http://www.intersil.com/cda/Support/contacts/>

## Evaluation Boards Schematics

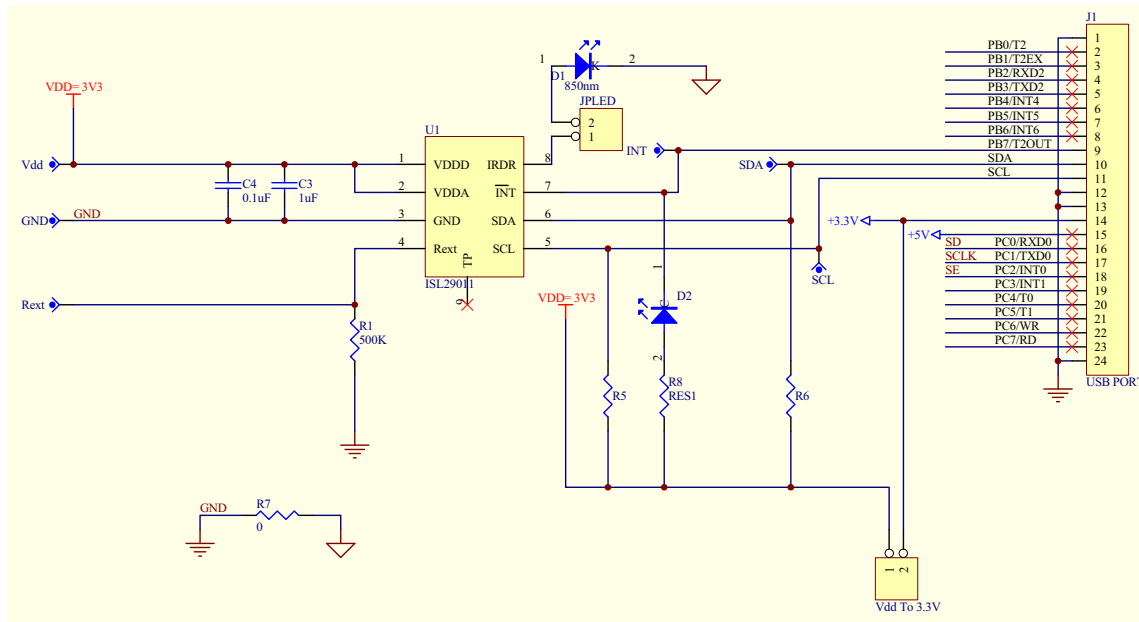


FIGURE 49. ISL29011, ISL29018, ISL29021 EVALUATION BOARD SCHEMATIC

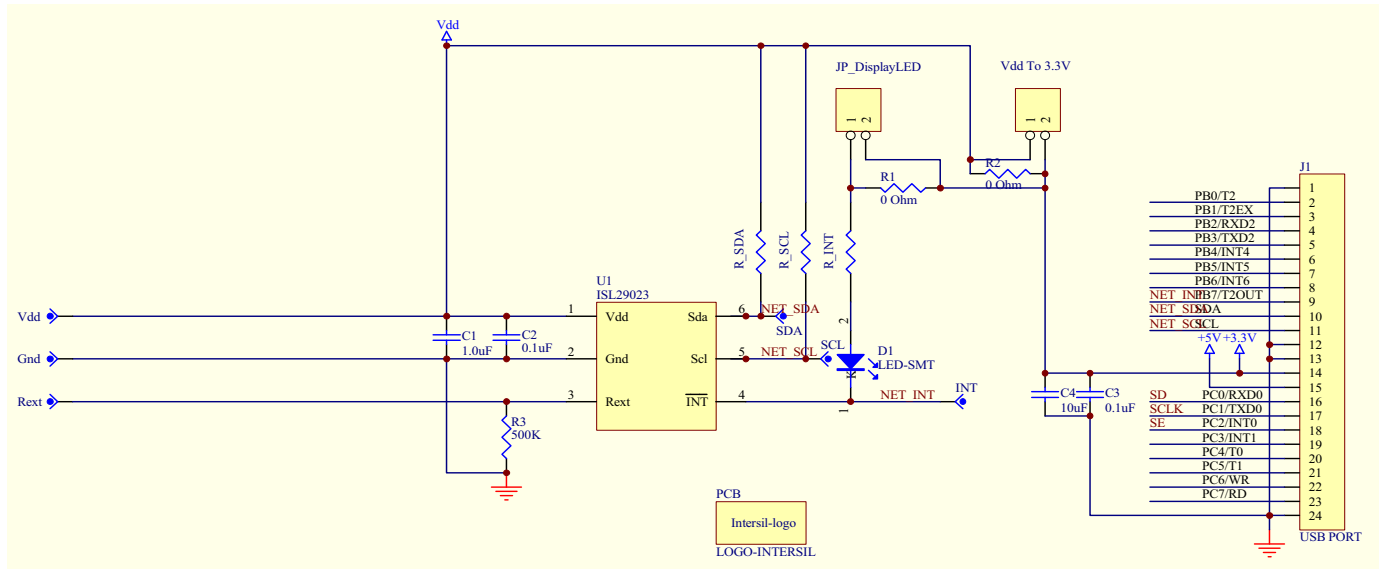


FIGURE 50. ISL29023 EVALUATION BOARD SCHEMATIC





## Evaluation Boards Schematics (Continued)

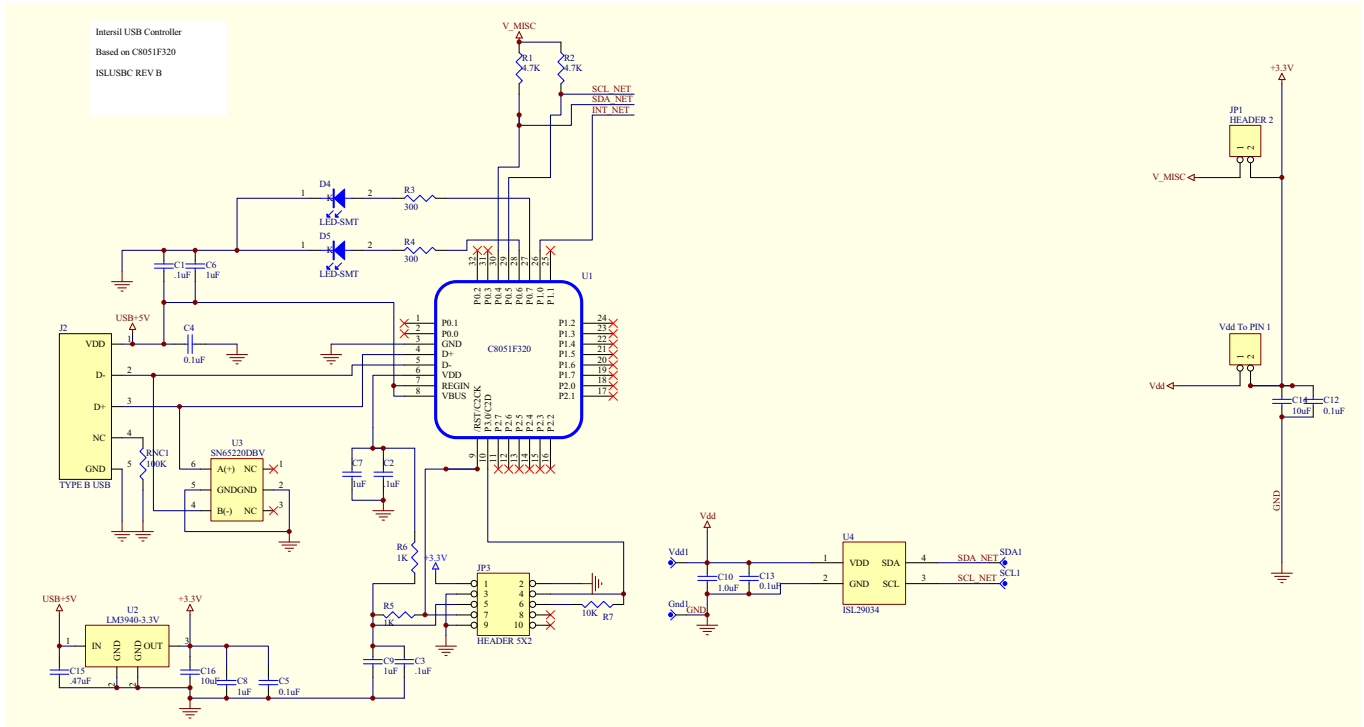


FIGURE 53. ISL29034 EVALUATION BOARD SCHEMATIC

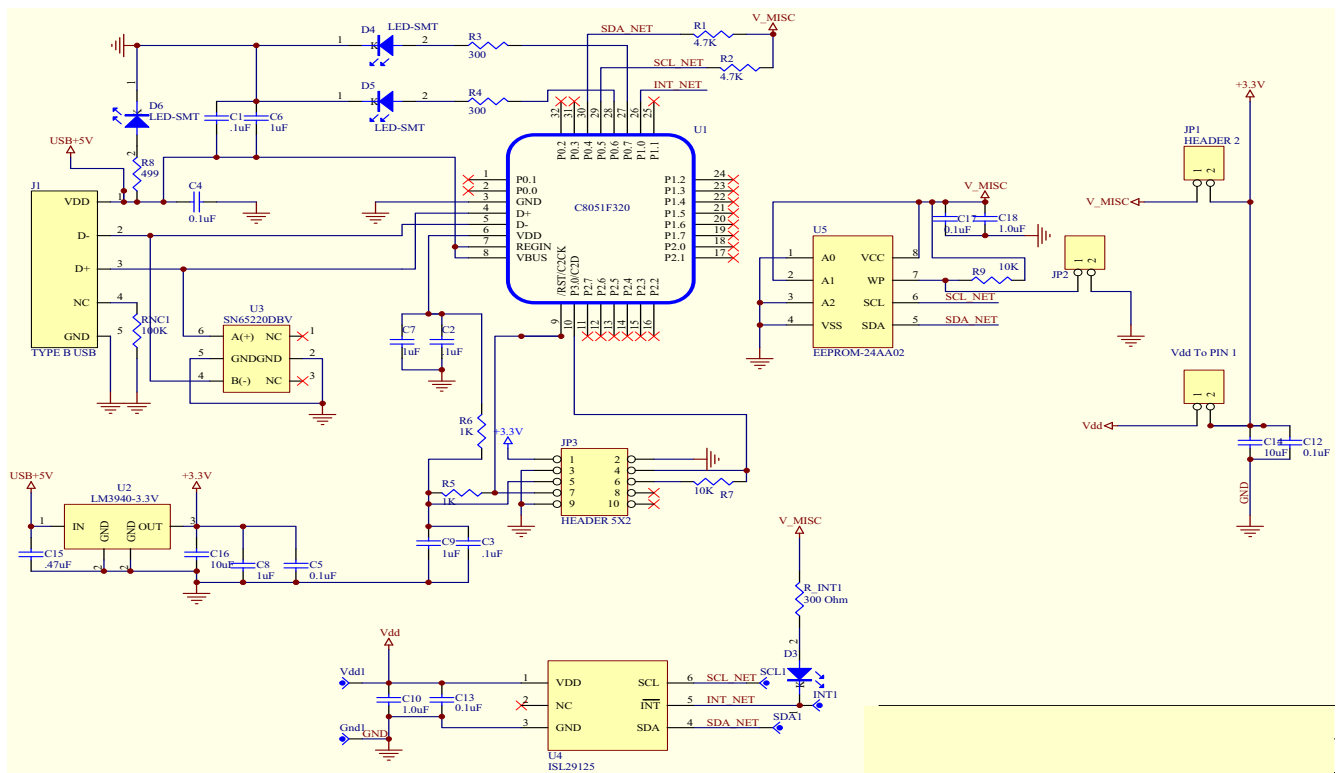


FIGURE 54. ISL29125 EVALUATION BOARD SCHEMATIC

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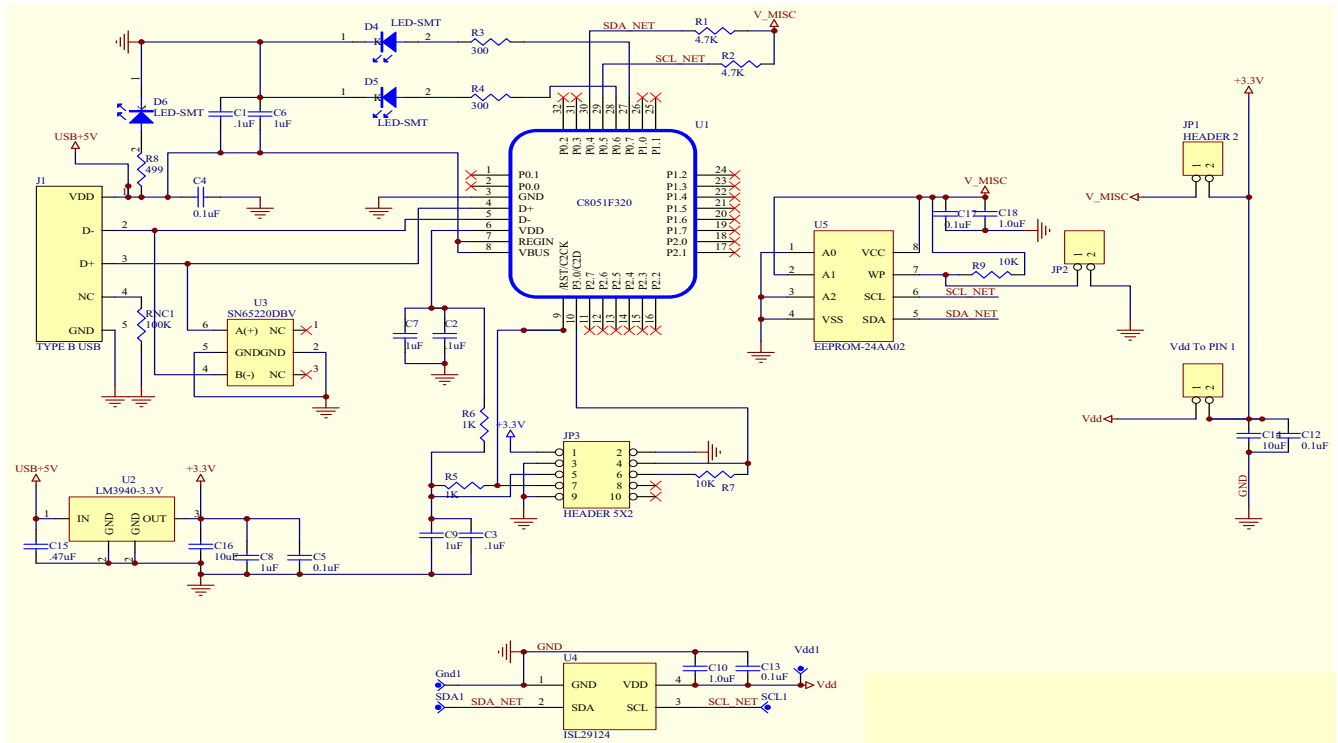


FIGURE 55. ISL29124 EVALUATION BOARD SCHEMATIC

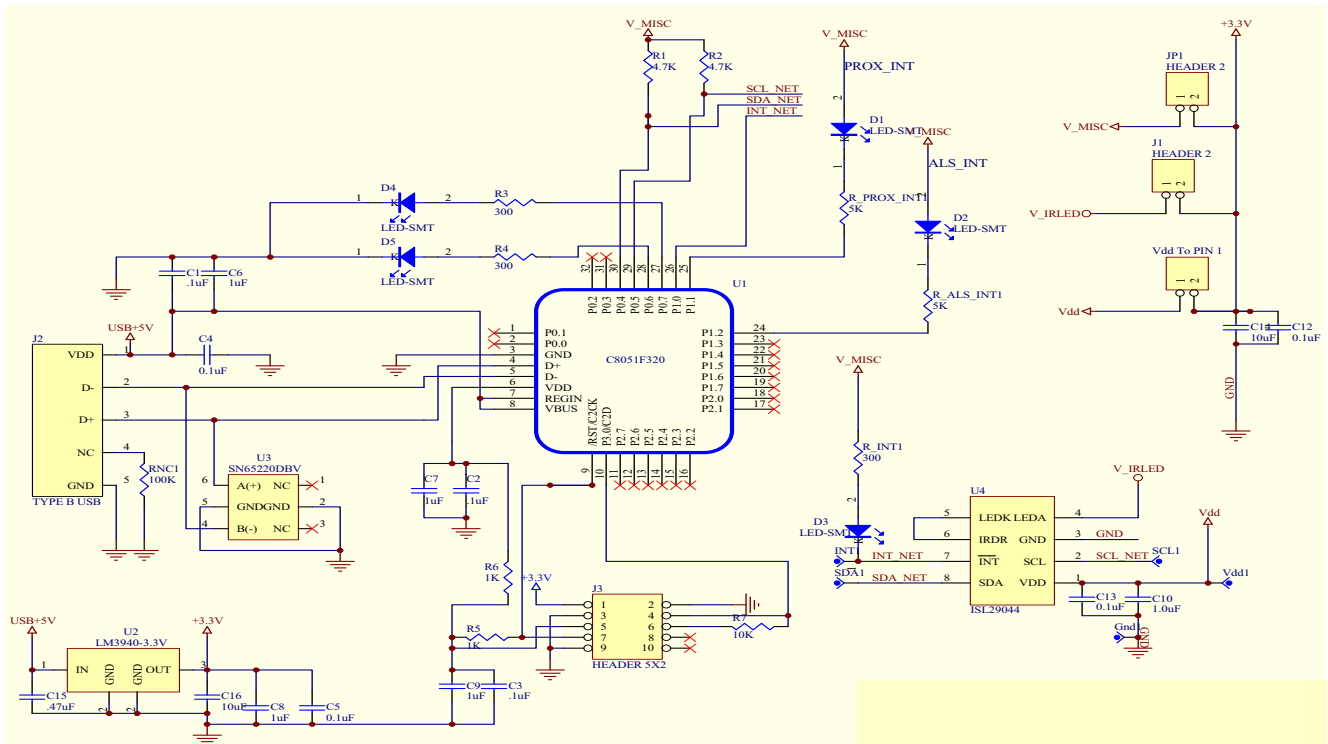


FIGURE 56. ISL29044/44A/147 EVALUATION BOARD SCHEMATIC

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 document is current before proceeding.

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