ISL290XXIROZ-EVALZ, ISL29XXXEVAL1Z

Evaluation Hardware/Software Manual for ALS and Proximity Sensors

(http://www.intersil.com/lightsensor/)

Ambient Light Sensor Products

	ALS	IR	PROXIMITY
ISL29011 FAMILY			
ISL29011 (Note 2)	X	X	X
ISL29018 (Note 2) (No longer supported)	X	X	X
ISL29021 (Note 2)		X	X
ISL29023 (Note 2)	X	X	
ISL29033 (Note 1)	X	X	
ISL29034/35 (Note 1)	X		
ISL29038 (Note 1)	X		X
RGB FAMILY			
ISL29124	X		
ISL29125	X		
ISL29028 FAMILY			
ISL29027			X
ISL29028 (No longer supported) ISL29028A	X	X	X
ISL29030 (No longer supported) ISL29030A	X	X	X
ISL29040 (No longer supported) ISL29042 (No longer supported)	X	X	X
ISL29044(No longer supported) ISL29044A	X	X	X
ISL29147	X	X	X
STAND ALONE			
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.

Table of Contents

Ordering Information

PART NUMBER	DESCRIPTION
ISL29011IROZ-EVALZ	ISL29011 Evaluation Board
ISL29018IROZ-EVALZ	ISL29018 Evaluation Board
ISL29020IROZ-EVALZ	ISL29020 Evaluation Board
ISL29021IROZ-EVALZ	ISL29021 Evaluation Board
ISL29023IROZ-EVALZ	ISL29023 Evaluation Board
ISL29028AIROZ-EVALZ	ISL29028A Evaluation Board
ISL29030IROZ-EVALZ	ISL29030 Evaluation Board
ISL29030AIROZ-EVALZ	ISL29030A Evaluation Board
ISL29033IROZ-EVALZ	ISL29033 Evaluation Board
ISL29034IROZ-EVALZ	ISL29034 Evaluation Board
ISL29038IROZ-EVALZ	ISL29038 Evaluation Board
ISL29125EVAL1Z	ISL29125 Evaluation Board
ISL29124EVAL1Z	ISL29124 Evaluation Board
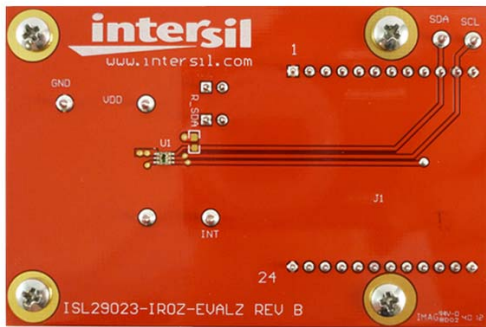
Evaluation Boards

FIGURE 1A. TOP

FIGURE 1B. BOTTOM

FIGURE 1. ISL29023 EVALUATION BOARD

FIGURE 2A. TOP
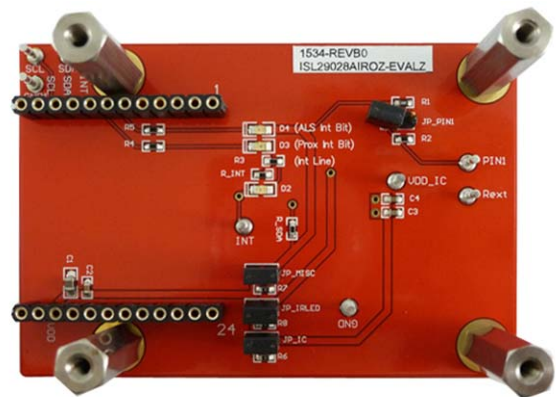
FIGURE 2B. BOTTOM

FIGURE 2. ISL29028A EVALUATION BOARD

Evaluation Boards (Continued)

FIGURE 3A. TOP
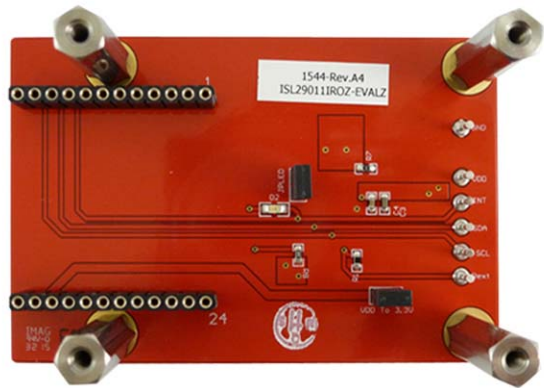
FIGURE 3B. BOTTOM

FIGURE 3. ISL29011 EVALUATION BOARD FAMILY
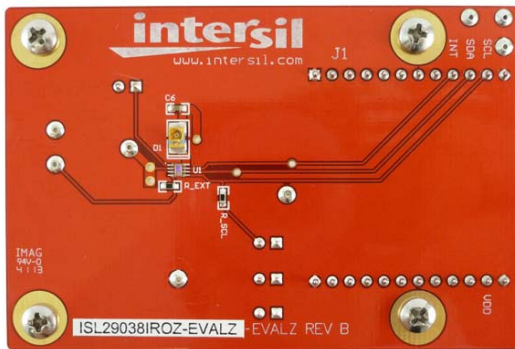
FIGURE 4A. TOP

FIGURE 4B. BOTTOM

FIGURE 4. ISL29038 EVALUATION BOARD

FIGURE 5. ISL29035 EVALUATION BOARD

FIGURE 6. ISL29034 EVALUATION BOARD FAMILY

Evaluation Boards (Continued)

FIGURE 7. ISL29125 EVALUATION BOARD

FIGURE 8. ISL29124 EVALUATION BOARD

FIGURE 9. ISL29020 EVALUATION BOARD
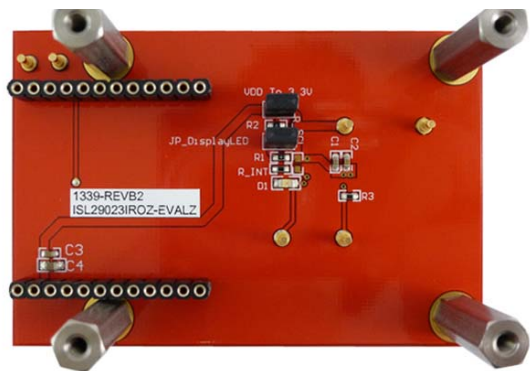

FIGURE 10. ISL29044 EVALUATION BOARD

FIGURE 11A. TOP

FIGURE 11B. BOTTOM

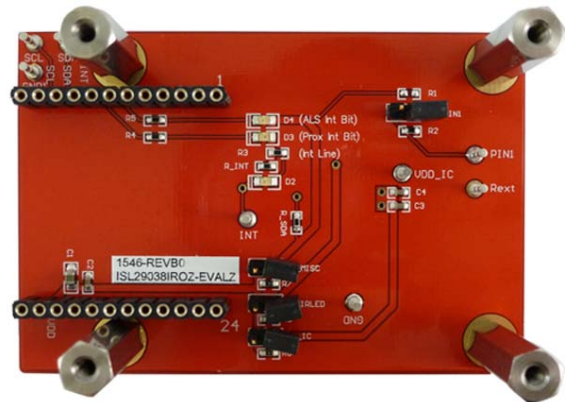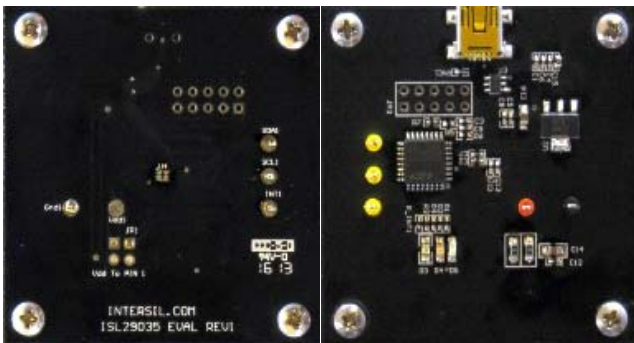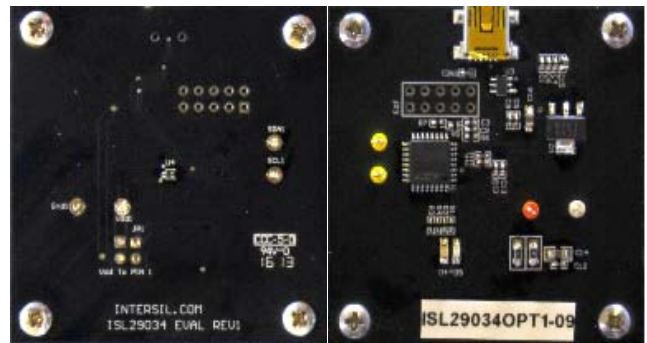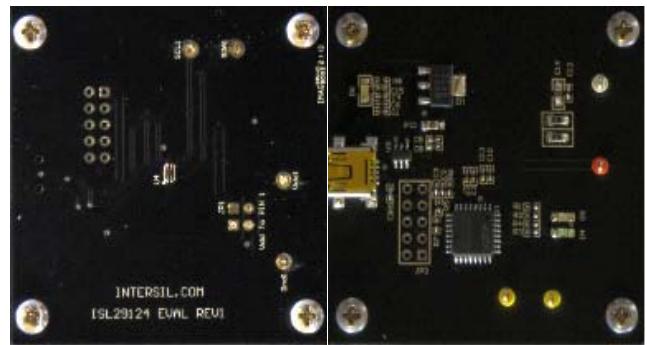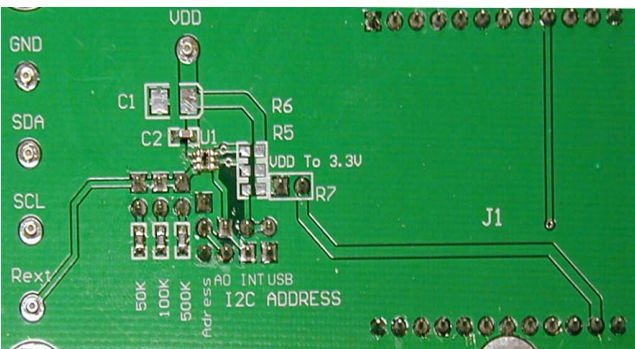FIGURE 11. ISL29044A EVALUATION BOARD

Evaluation Package

- Evaluation board
- 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 14.

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:

ISL29011	ISL29023	ISL29038
ISL29018	ISL29027	ISL29044A
ISL29020	ISL29028	ISL29124
ISL29021	ISL29030	ISL29125
ISL29147	ISL29035	

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 12. 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*
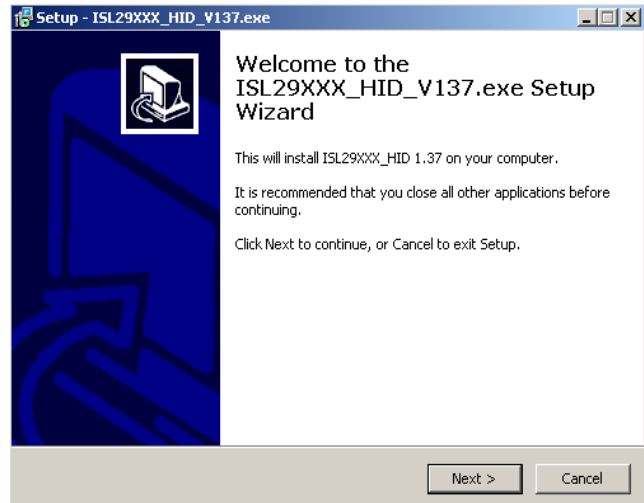
FIGURE 12.

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 13 (Start →Intersil →Intersil_29XXX_HID→ Intersil_29XXX_HID)

FIGURE 13.

- Once you have double-clicked the program, the window displayed in Figure 14 should open.

FIGURE 14.

- 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 15.
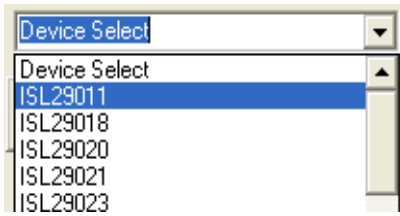
FIGURE 15.

- 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 16 is green. If it is not green, check your connection.

FIGURE 16.

- **Test Communication** with the IC by clicking the button shown in Figure 17; 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 17.

Note: This is common for all devices.

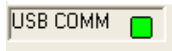- From the menu on the left, choose the specific **"Operation"** in which you would like to operate the IC, as shown in Figure 18. A detailed explanation is described in the datasheet (ISL29023). Table 1 summarizes the different modes.
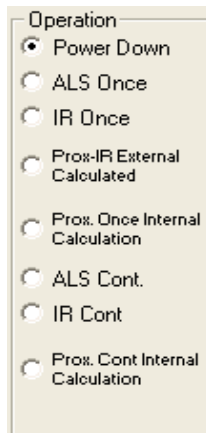
FIGURE 18.

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).

- **Integration Time** in Figure 19 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.
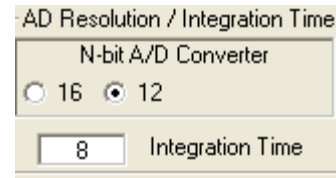
FIGURE 19.

- **Sensitivity-Range Select** in Figure 20 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.
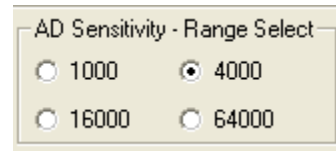
FIGURE 20.

The section shown in Figure 21 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.
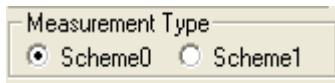
FIGURE 21.

The section shown in Figure 22 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 22.

The section shown in Figure 23 displays data of device registers.

FIGURE 23.

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.

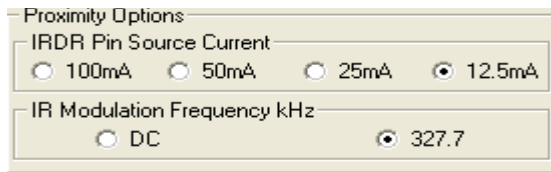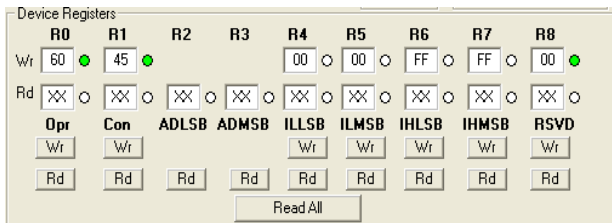### REGISTERS 0x03 TO 0x07 – INTERRUPT THRESHOLDS

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 datasheet for more information on interrupt limits.

The section shown in Figure 24 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.
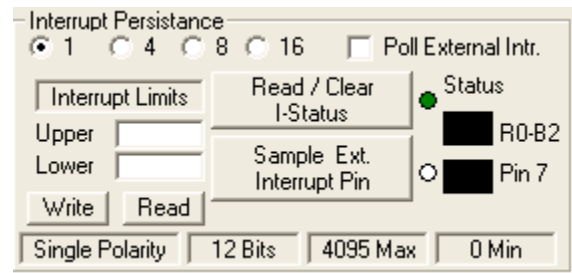

FIGURE 24.

TABLE 2. DEFINITIONS OF TRIP POINT SETTINGS

SETTING	DESCRIPTION
Interrupt Persistence	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.
Interrupt Limits	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)
Write	Stores value to memory in Registers 4 through 7.
Read	Reads limit values stored in Registers 4 through 7.
Read/Clear I-Status	Checks the 2nd 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.
Sample Ext. Interrupt Pin	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.
Poll External Intr.	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.

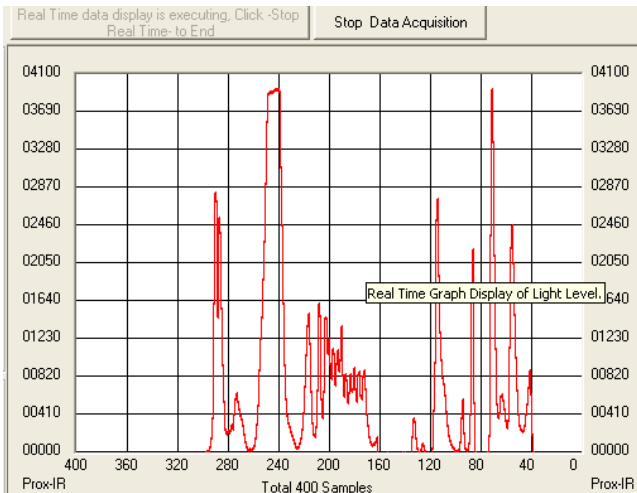   - "**Stop Data Acquisition**" stops sampling of data.

FIGURE 25.

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 26](#)).

   - **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 26.

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.

Running the Program for ISL29020

To open the program, go to the "Start" menu, as shown in [Figure 27](#).

FIGURE 27.

   - (Start →Intersil →Intersil_29XXX_HID→Intersil_29XXX_HID).

   - Once you have double-clicked the program, the window displayed in [Figure 28](#) should open.

FIGURE 28.

   - 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.
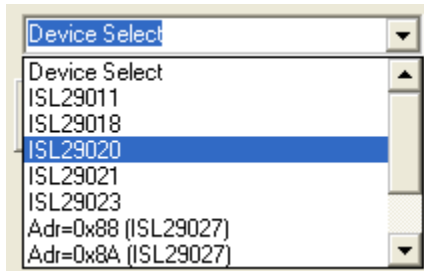
FIGURE 29.

• **USB Communication** - Check to make sure the light shown in Figure 30 is green. If it is not green, check your connection.

FIGURE 30.

• **Test Communication** with the IC by clicking the button shown in Figure 31; 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 31.

The section shown in Figure 32 allows the ADC-Core to be enabled. The user needs to check "Enable ADC-Core" in order to enable the devices.
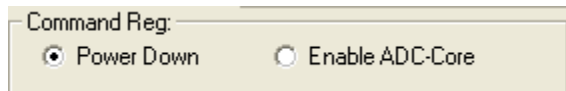
FIGURE 32.

The section shown in Figure 33 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.
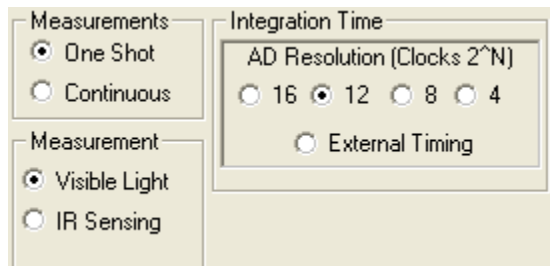
FIGURE 33.

The "External Timing" check box is another option to run when using external customer supplied timing.
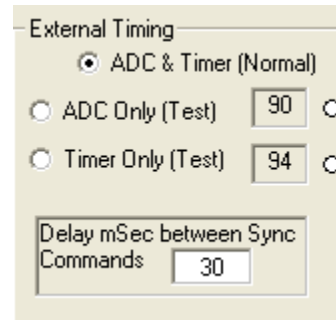
FIGURE 34.

Once the external timing from Integration Time is selected, Figure 34 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.
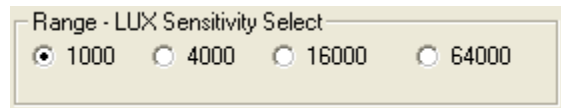
FIGURE 35.

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 35).

The section shown in Figure 36 allows the user to choose REXT to fix its internal oscillator frequency. 500kΩ is recommended for the devices.
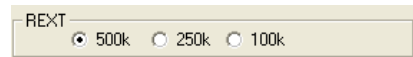
FIGURE 36.

Collect Data Graphical Real Time Data (Figure 37) 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.
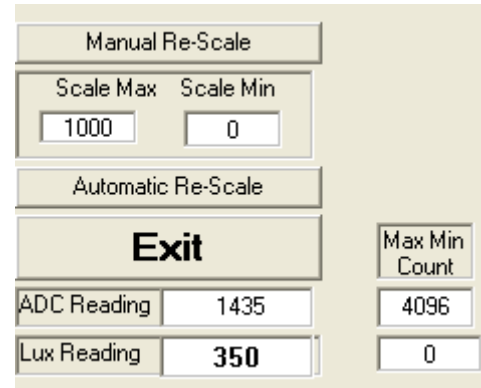
Saving Measurements to File

- 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 38). 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 37.

FIGURE 38.

FIGURE 39.   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 (see Figure 57). For help, contact the local Intersil sales/FAE team. (http://www.intersil.com/cda/Support/contacts/)

Connecting the PCB to PC

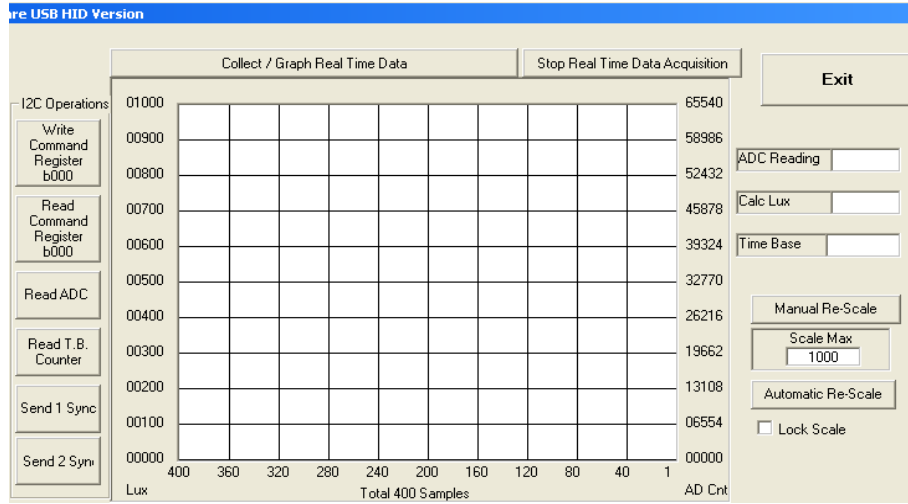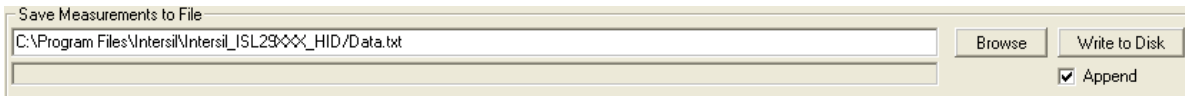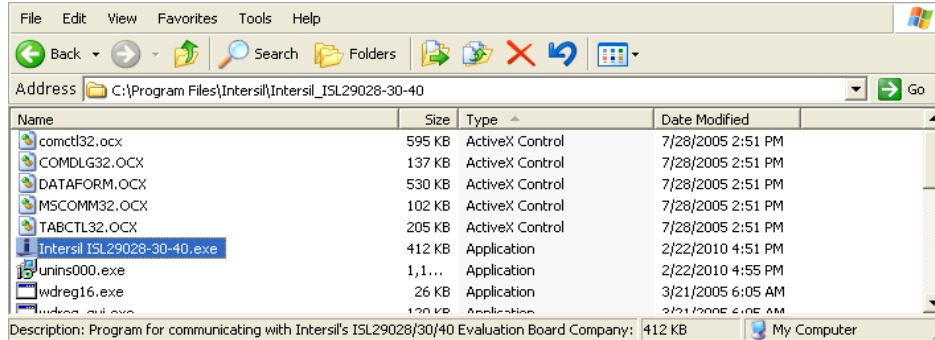Insert the USB-B plug into the Intersil evaluation PCB, and the USB-A plug into the user's PC. As seen in Figure 40, the status of the PC<–>PCB communication link is displayed in the colored box next to "Attached".

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 R_6, R_7, and R_8 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^2C address. ISL29030: Leave open (see "JP_PIN1" on page 12.
JP_IC	Connects 3.3V rail to VDD.
JP_MISC	Connects 3.3V rail I^2C 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^2C 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 39.

Double-click the highlighted executable shown in Figure 39 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 40 should turn green.

The ISL29028 has a selectable I^2C address (see pin *ADDR0*). By changing the input logic signal (via jumper *JP_PIN1*), the I^2C 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^2C address 0x88.
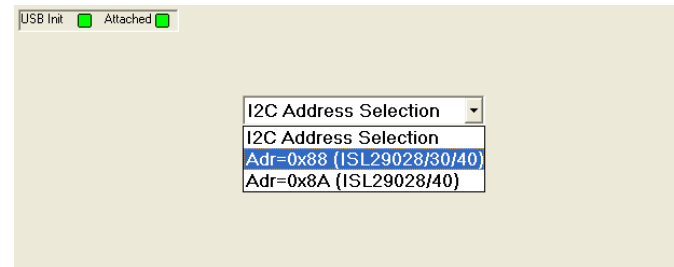

FIGURE 40. SOFTWARE START-UP SCREEN
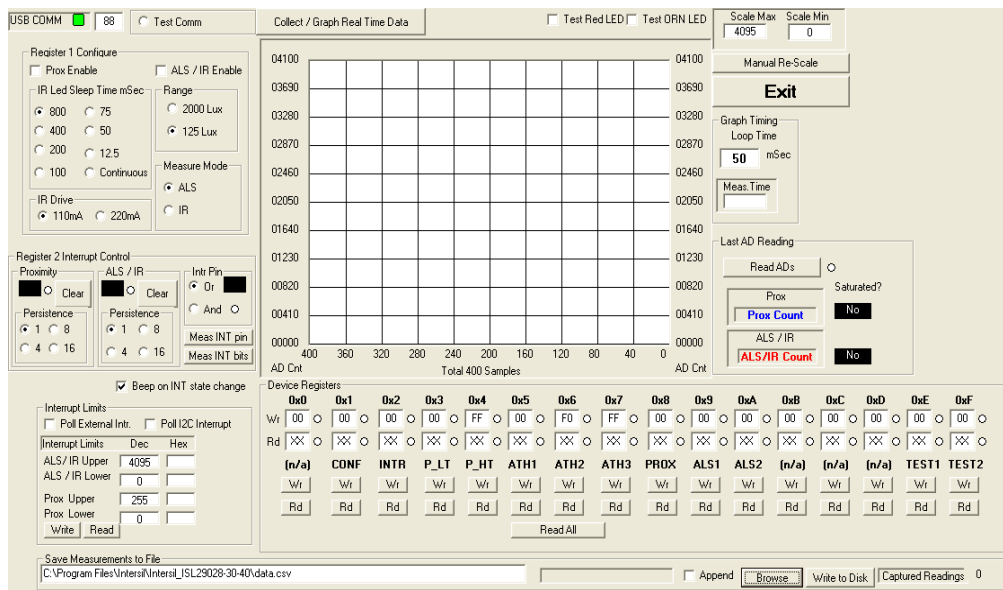

FIGURE 41. SOFTWARE MAIN SCREEN

Main Window

The main evaluation software window can be seen in Figure 41.

If the user desires to change the I^{2}C address the GUI communicates with, see the upper-left box containing "88" in Figure 41. 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^{2}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^{2}C Interrupt" check box - the GUI will perform an I^{2}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 41. 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 42).

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.
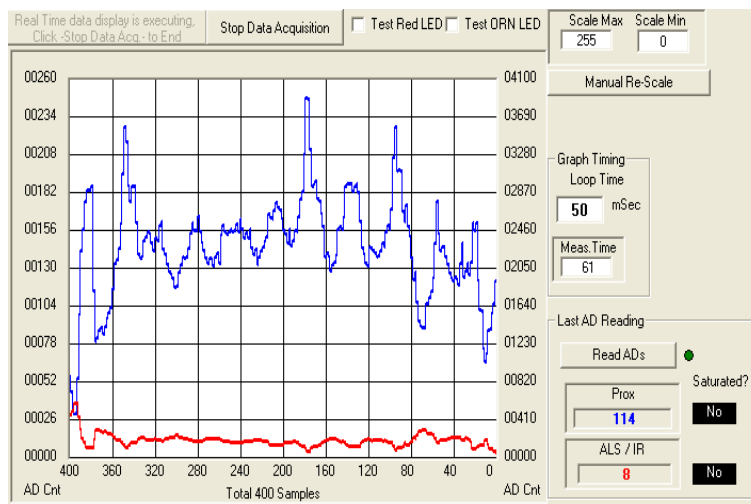

FIGURE 42.   REAL-TIME DATA ACQUISITION GRAPH

Hardware Setup ISL29124, ISL29125 Family

Schematic and Layout

The PCB schematics are shown in Figures 60 and 61. 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 43. 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 43. 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 44.
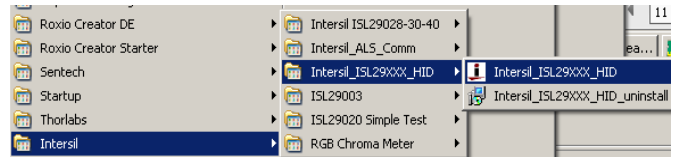
FIGURE 44. SOFTWARE START-UP SCREEN

Double-click the highlighted executable shown in Figure 45, 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 46. Double-click on "USB COM" located on left top corner of "Real Time Data Acquisition Graph", all registers will display.
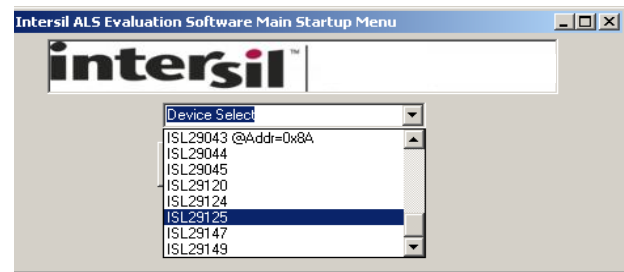
FIGURE 45. SOFTWARE START-UP SCREEN
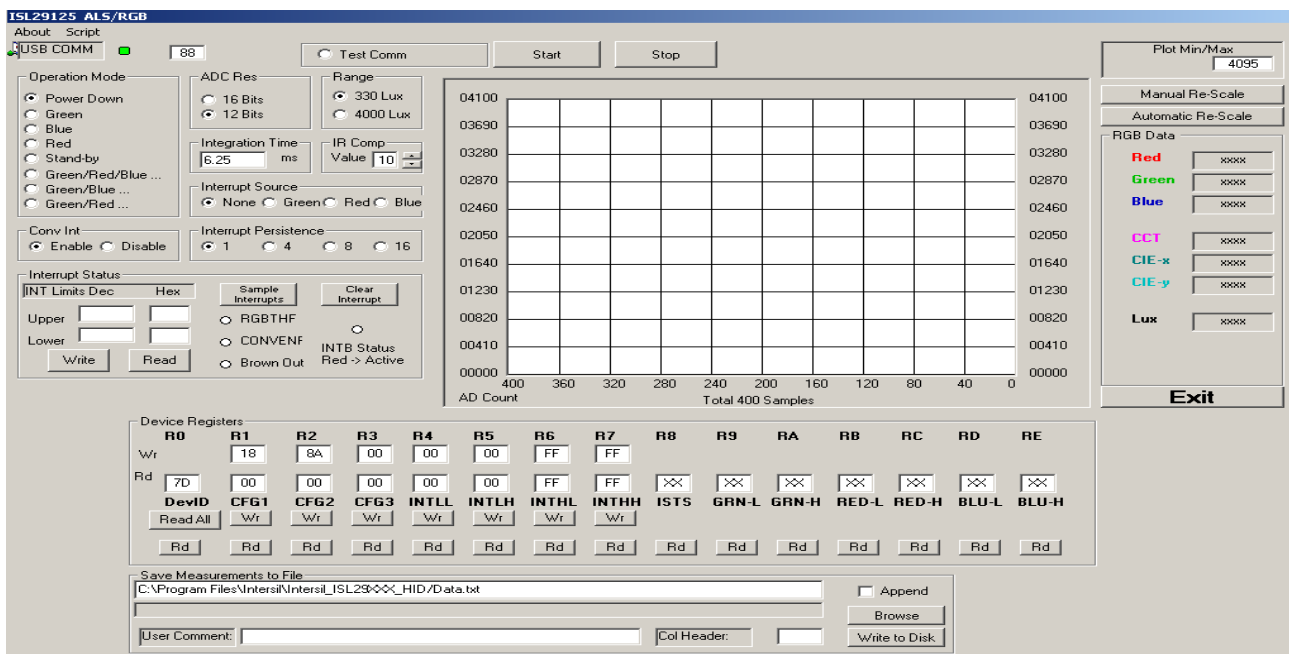
FIGURE 46. SCREEN BEFORE REAL-TIME DATA ACQUISITION GRAPH - ISL29125

Main Window

The main evaluation software window can be seen in Figure 46. the upper-left box containing "88" is I^{2}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^{2}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 0x02 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.
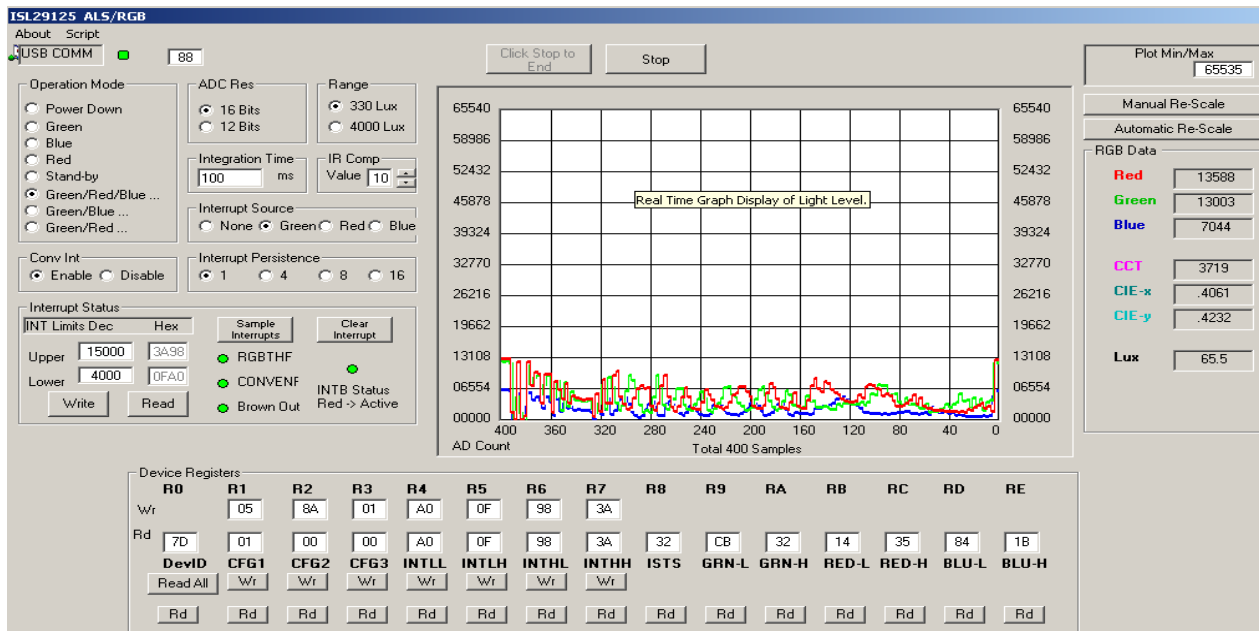

FIGURE 47.   REAL-TIME DATA ACQUISITION GRAPH - ISL29125

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 46. 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 47 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.

Hardware Setup ISL29038

Schematic and Layout

The PCB schematic is shown in Figure 63. 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 standard USB plug into the Intersil evaluation board, and the USB-B plug into the user's PC.

Running the Program for ISL29038 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 48.

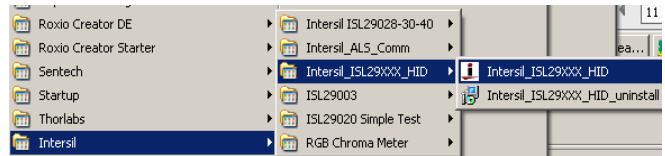

FIGURE 48. SOFTWARE START-UP SCREEN

Click on the highlighted executable file as shown in Figure 48, then "Intersil ALS Evaluation Software Main Startup Menu" will display. Click on the drop-down list to select ISL29038 as shown in Figure 49.

After selecting ISL29038, "Real Time Data Acquisition Graph" will display shown in Figure 50. Double-click on "USB COM" located on left top corner of "Real Time Data Acquisition Graph", to display "Device Registers" and "Save Measurements to File".
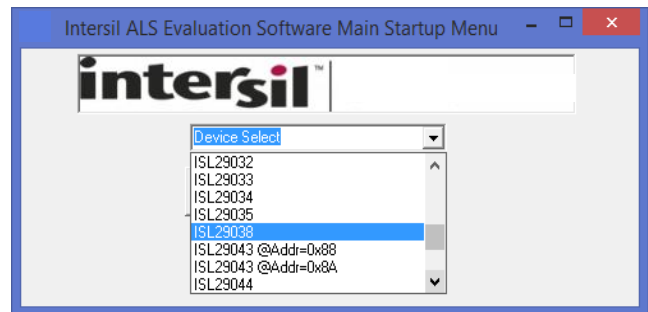

FIGURE 49. SOFTWARE START-UP SCREEN

Main Window

The main evaluation software window can be seen in Figure 50. the upper-left box containing "88" is I^2C slave address. Click the "Test Comm" box to test for a valid communication link between the PC and Light Sensor at the specified I^2C address. ISL29038 can work in two configurations - Proximity configuration and ALS configuration. Check the box to run the desired configuration.

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 is used for proximity configuration. This a read/write register and can be used to set sleep time and LED current. All the bits are explained in the datasheet.

REGISTER 0x02 – CONFIGURATION II REGISTER

IC register 0x02 is designed for configuring ALS. This is a read/write register. Interrupt algorithm and ALS range can be configured using this register.

REGISTER 0x03 – CONFIGURATION III REGISTER

IC register 0x03 contains the ALS IR compensation and ALS infrared compensation bits.

REGISTERS 0x04 TO 0x09 – INTERRUPT THRESHOLDS

The PROX and ALS interrupt thresholds are stored in registers 0x04 to 0x09. 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 0x0A TO 0x0C – DATA REGISTERS

Register 0x0A holds the result of proximity conversion. Registers 0x0B and 0x0C hold results for ALS measurement. The MSB of ALS data is available in 0x0B and LSB in 0x0C.

REGISTER 0x0D – DATA REGISTER

The register 0xD[7:1] contains ambient IR measurement in the proximity measurement phase. The datasheet has more details about this register.

REGISTER 0x0E – RESET REGISTER

This register is used for software reset.

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.
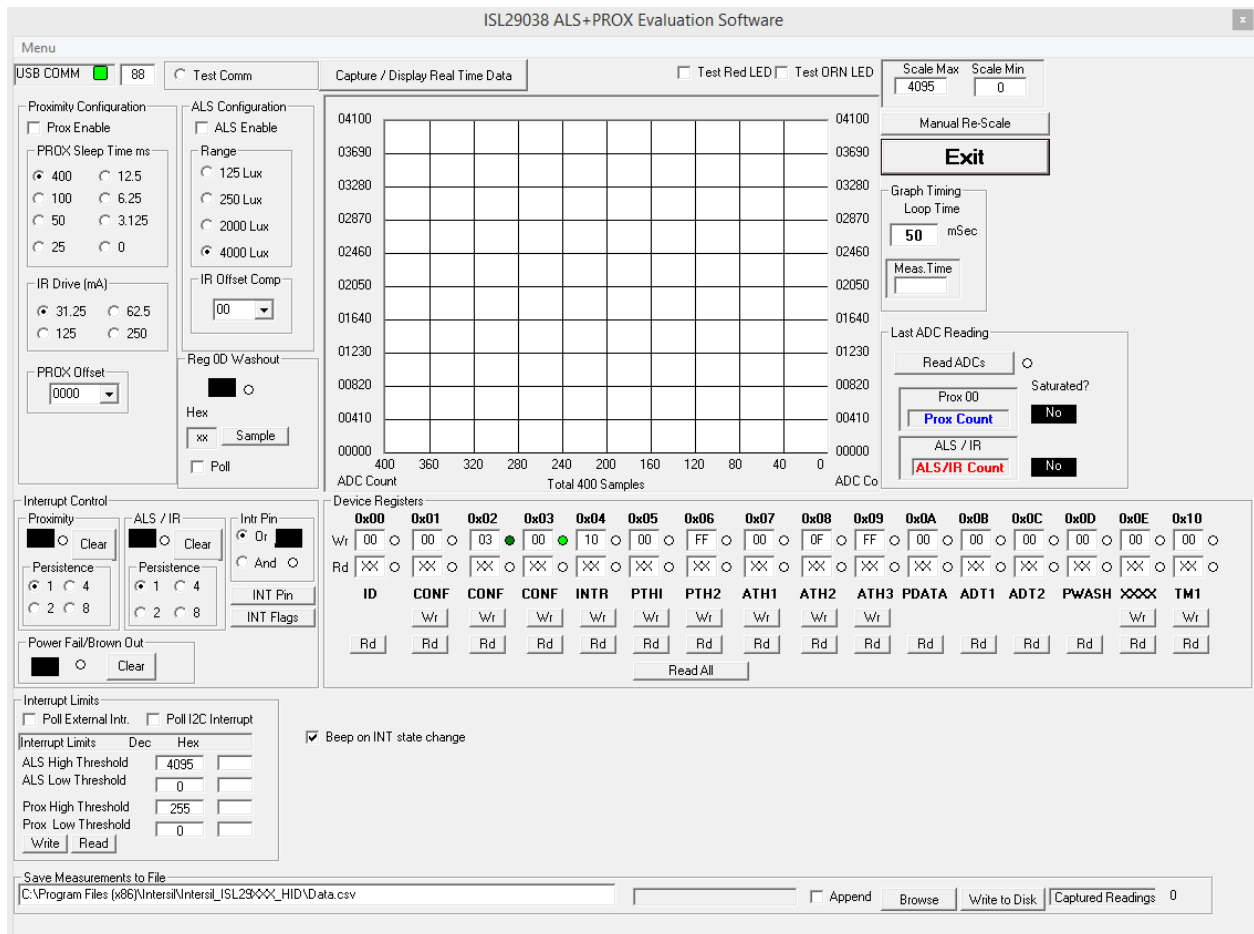

FIGURE 50. SCREEN BEFORE REAL-TIME DATA ACQUISITION GRAPH - ISL29038

REAL-TIME DATA ACQUISITION GRAPH

To graphically display the results of proximity and ALS conversions, first select the mode of configurations by checking the enable box. Either both or any one of the configurations can be selected. For configuring the proximity sensor, select the sleep time (ms) and IR drive current (mA) and for configuring the ALS, select the range (Lux). All the others can be left at their default values. Once configuring is done, click on "Capture/Display Real Time Data" button right above the graph. If both configurations are selected, proximity and ALS conversions will be displayed real time and simultaneously as shown in Figure 51. The red graph represents the ALS conversion and blue represents proximity conversions. The ADC codes for each configuration are displayed to the right of the graph.

GRAPH RE-SCALING

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 ALS and proximity 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.
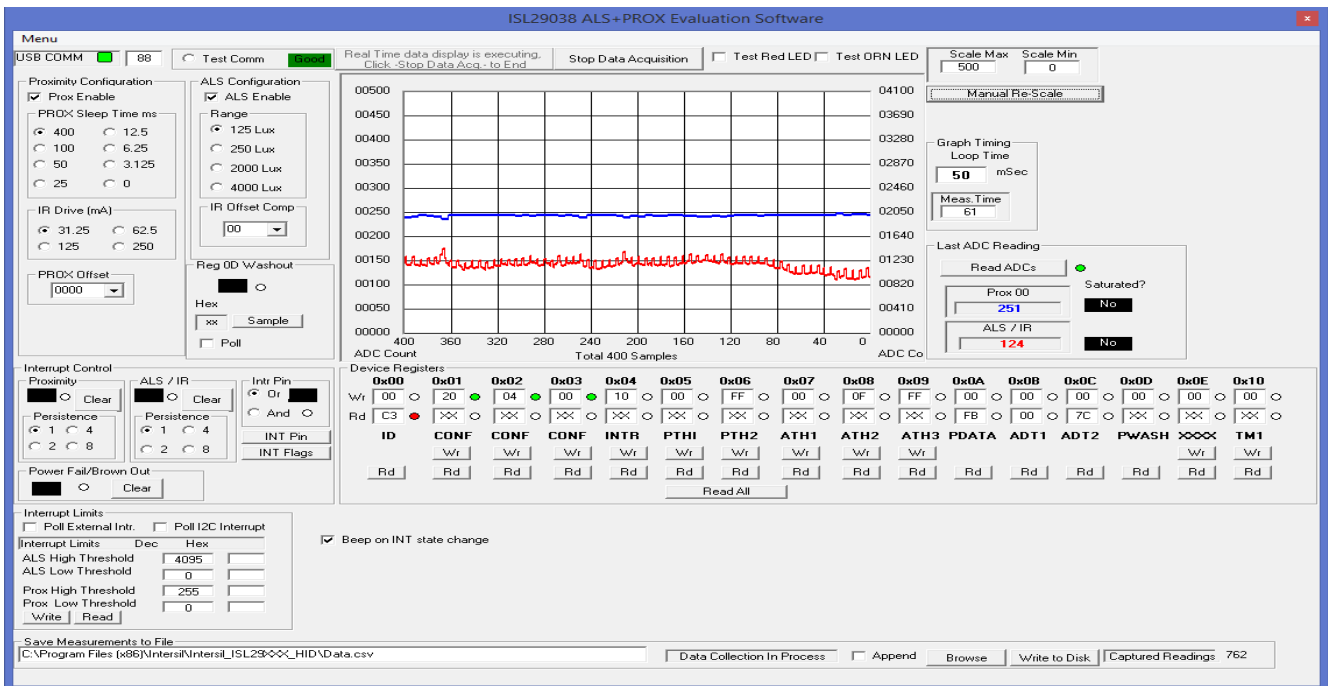

FIGURE 51. REAL-TIME DATA ACQUISITION GRAPH - ISL29038

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 microcontroller board to see if it is marked "HID" version or not. If not, you have the "Jungle" version.

FIGURE 52.

- 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.
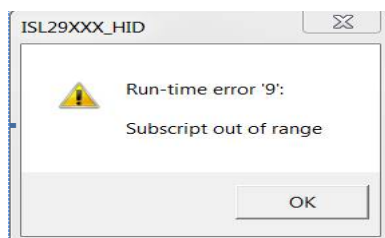
FIGURE 53.

- The screen shown in Figure 54 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).
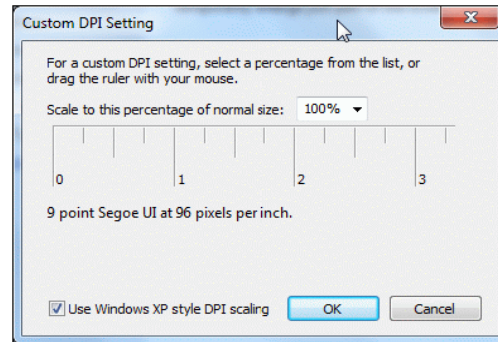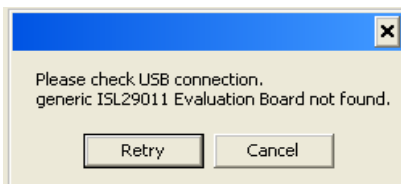

FIGURE 54.

For other questions, comments, and feedback, contact the local Intersil FAE/Sales team. (http://www.intersil.com/cda/Support/contacts/)

Evaluation Boards Schematics

FIGURE 55. ISL29011, ISL29018, ISL29021 EVALUATION BOARD SCHEMATIC

FIGURE 56. ISL29023 EVALUATION BOARD SCHEMATIC

Evaluation Boards Schematics (Continued)

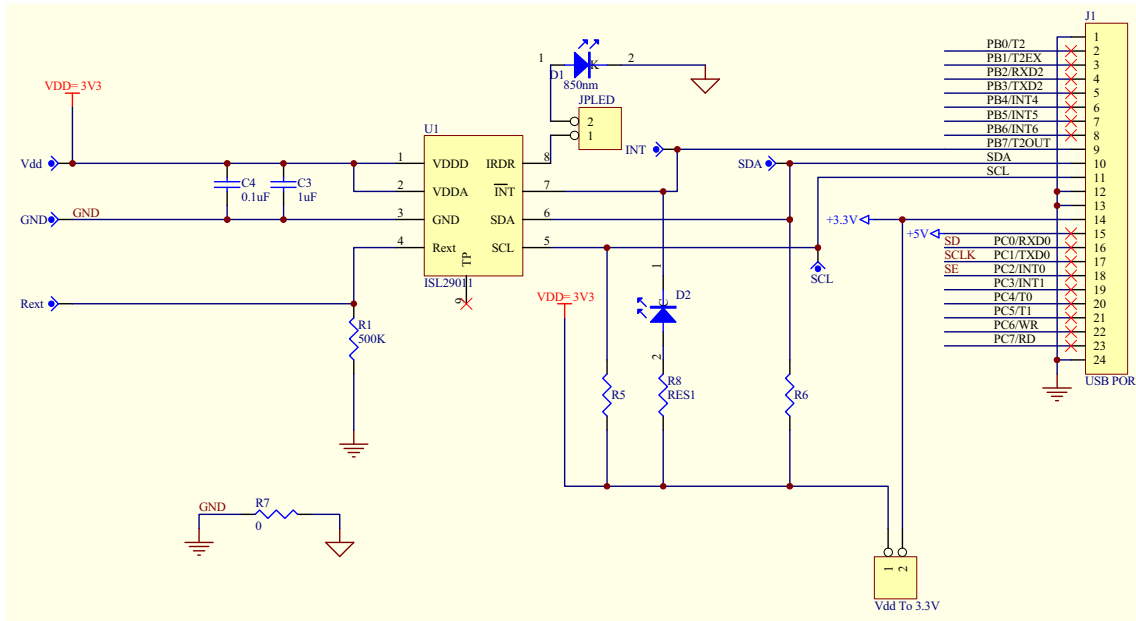**FIGURE 57. ISL29028, ISL29028A EVALUATION BOARD SCHEMATIC**

FIGURE 58. ISL29035 EVALUATION BOARD SCHEMATIC

Evaluation Boards Schematics (Continued)

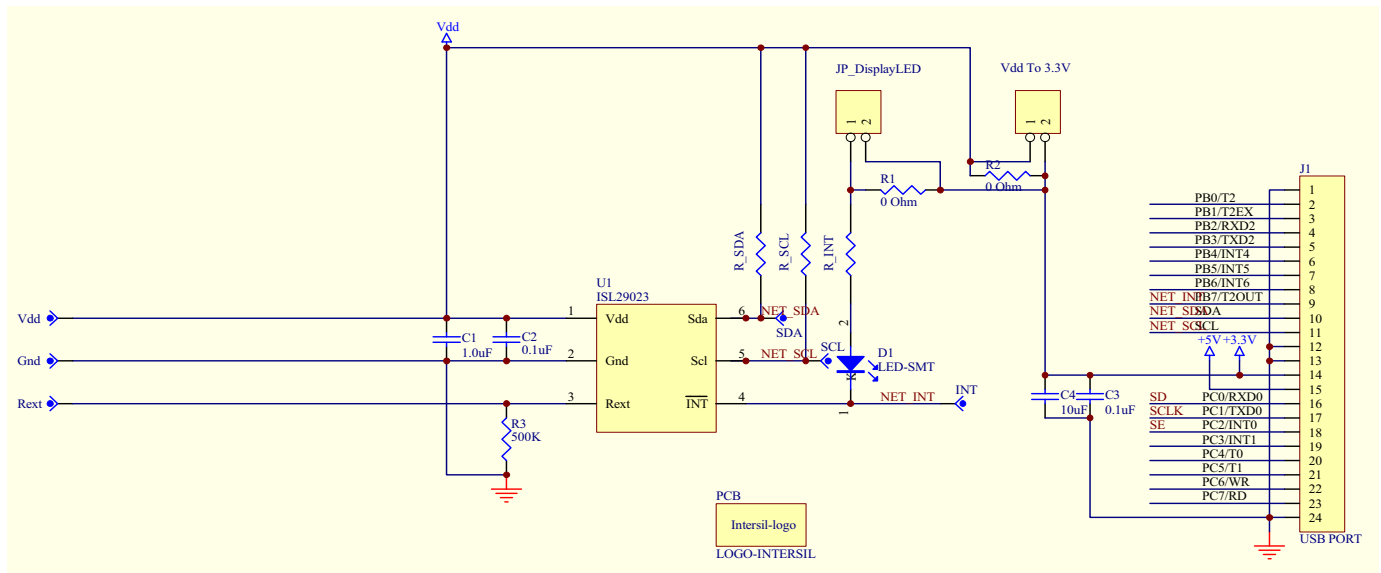**FIGURE 59. ISL29034 EVALUATION BOARD SCHEMATIC**

FIGURE 60. ISL29125 EVALUATION BOARD SCHEMATIC

RENESAS
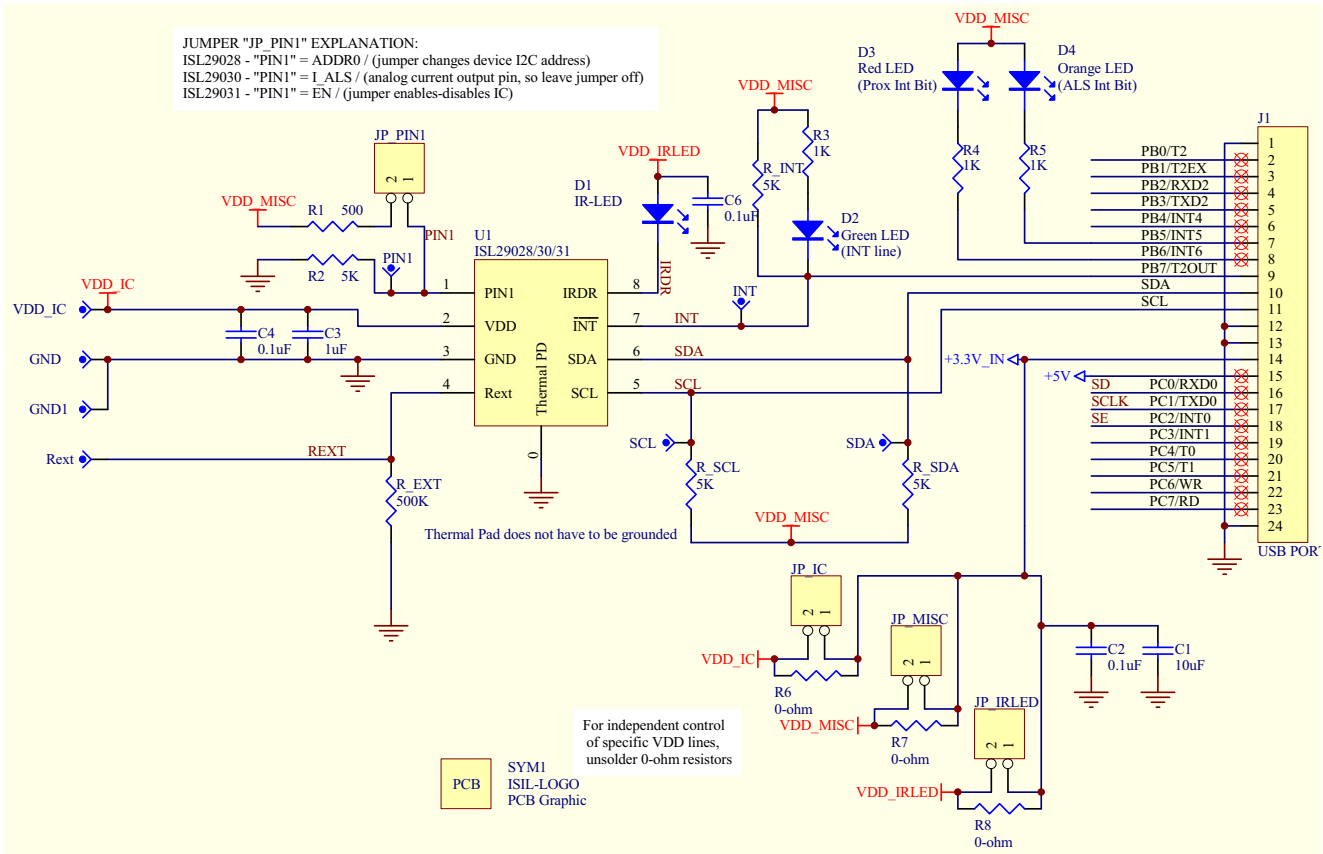
Evaluation Boards Schematics (Continued)

FIGURE 61. ISL29124 EVALUATION BOARD SCHEMATIC

FIGURE 62. ISL29044/44A/147 EVALUATION BOARD SCHEMATIC

Evaluation Boards Schematics (Continued)
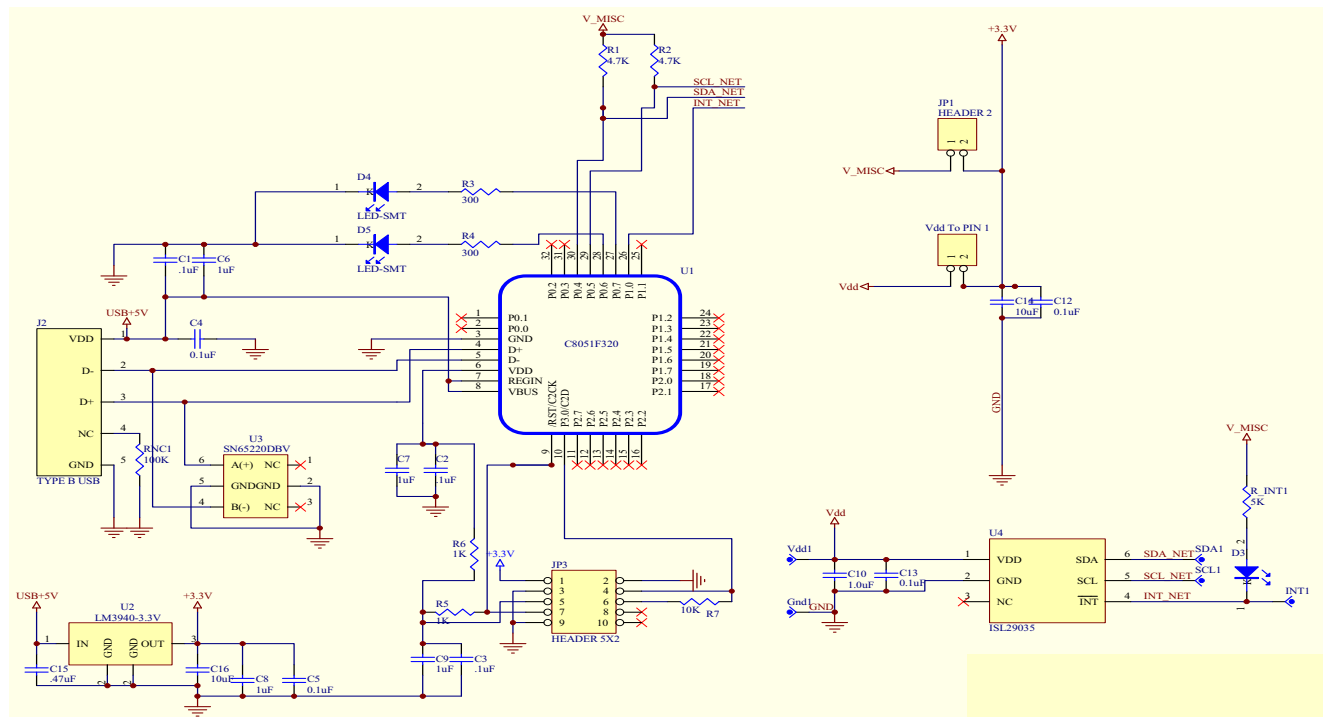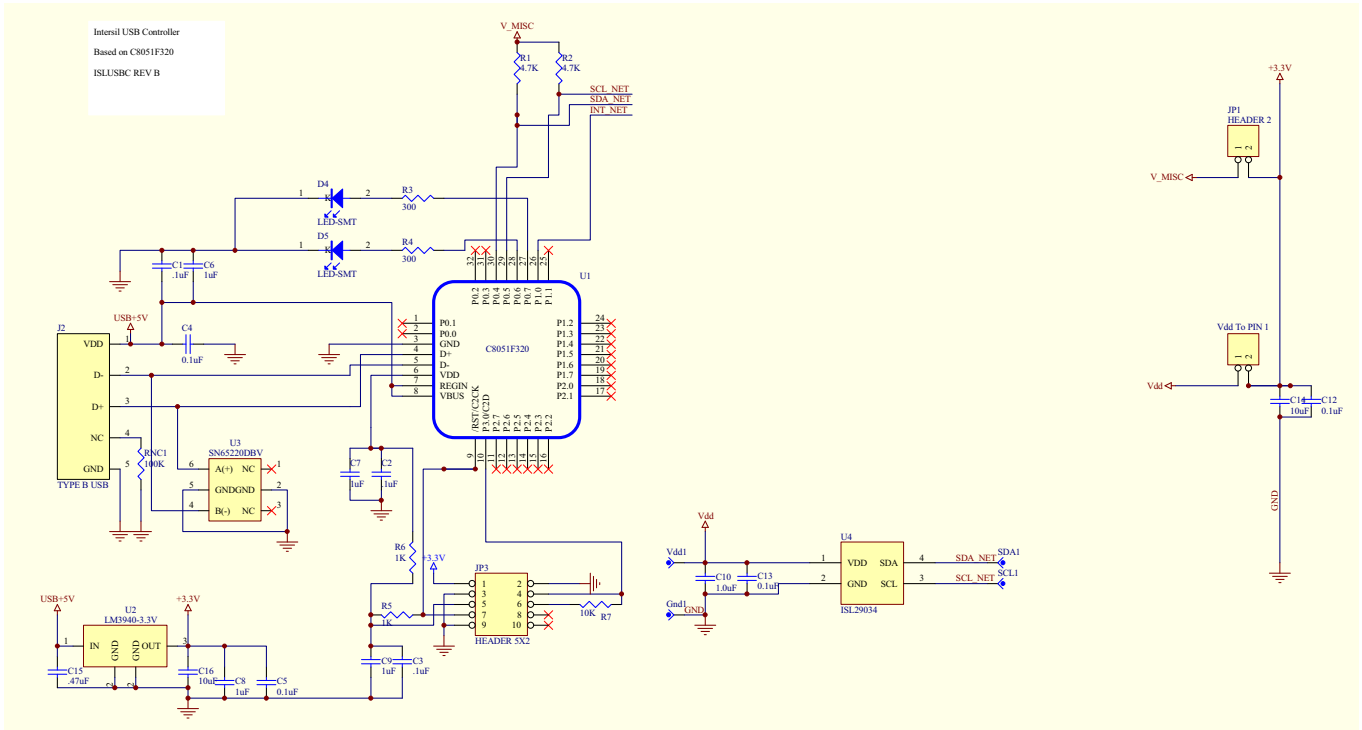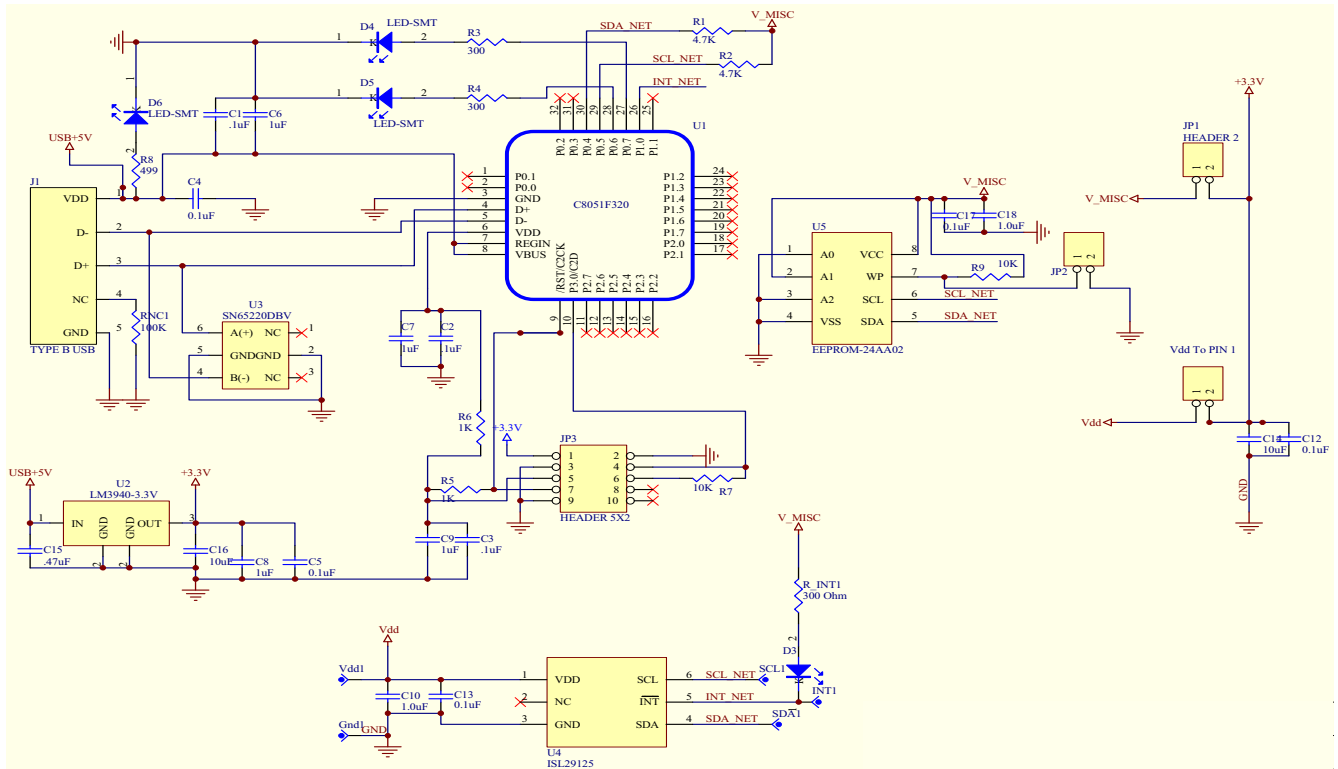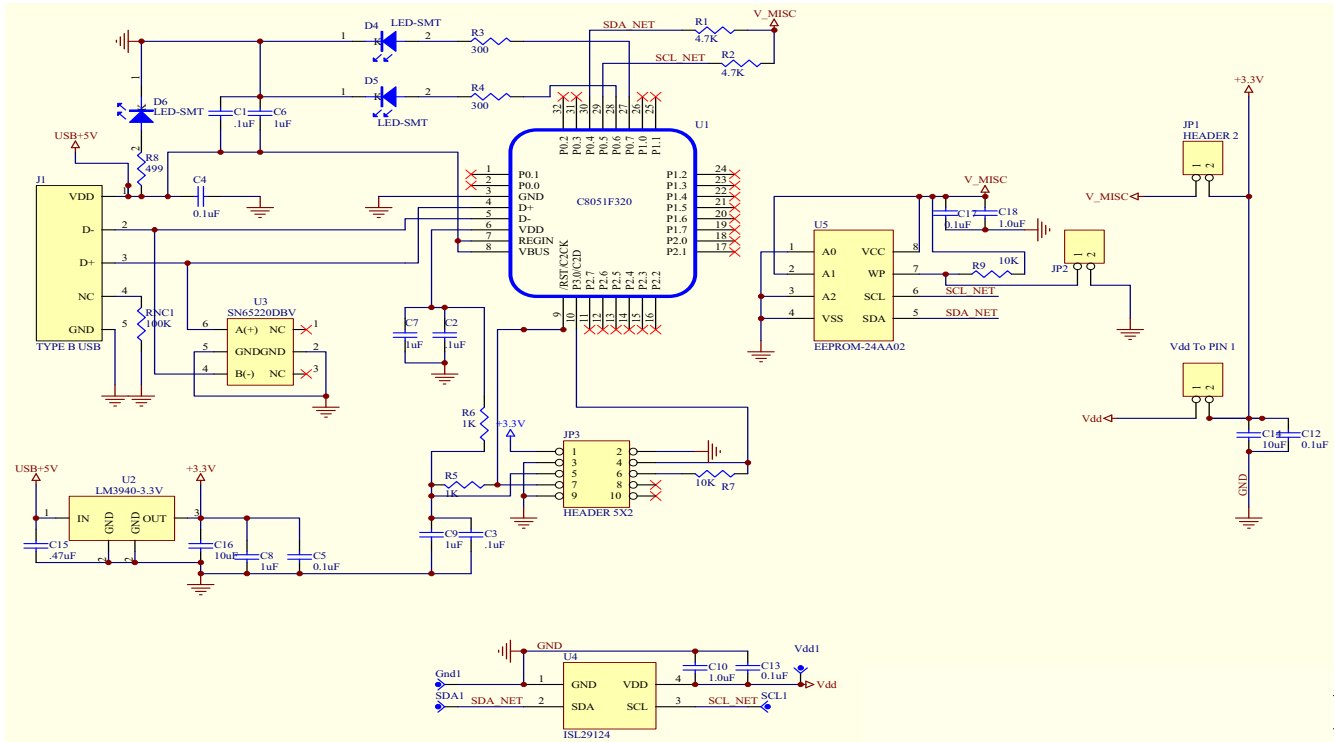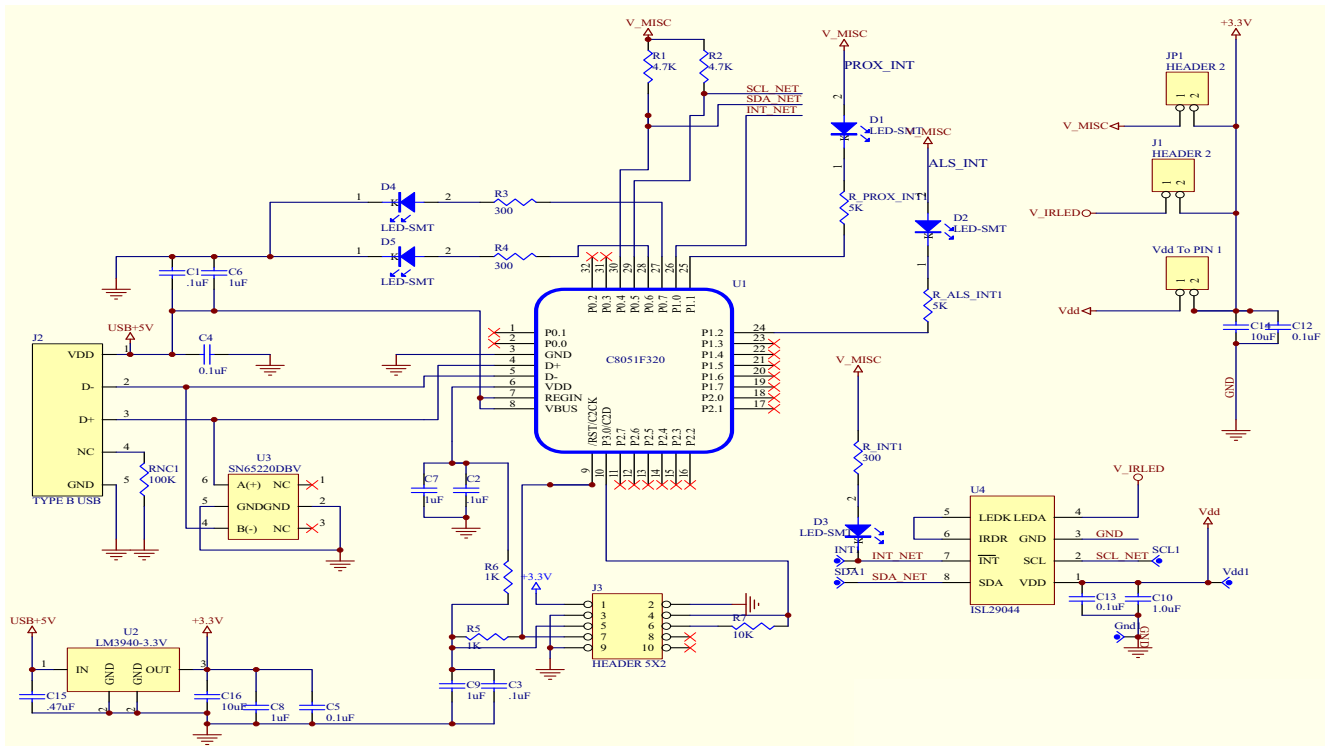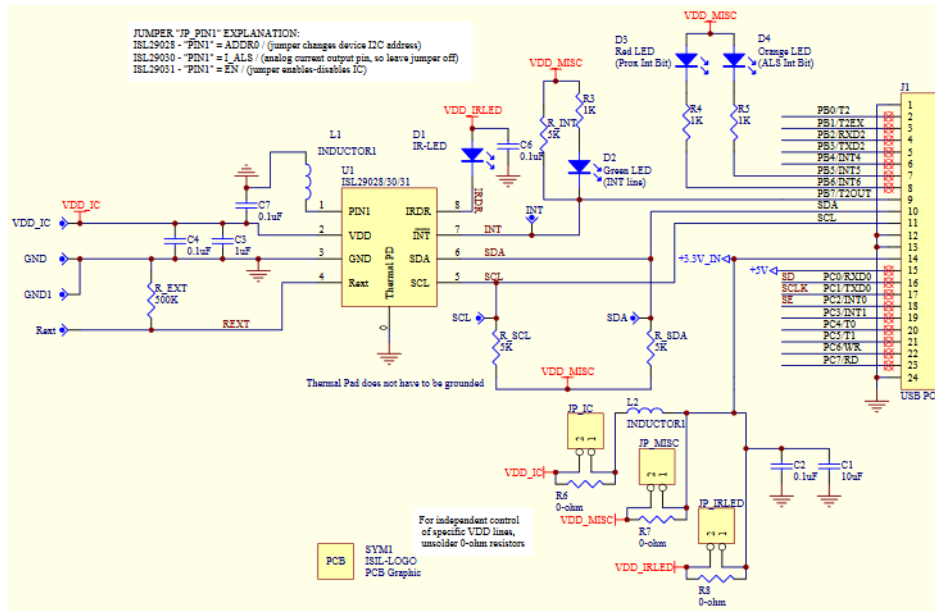

FIGURE 63. ISL29038 EVALUATION BOARD SCHEMATIC

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