

TSL4531 EVM

# USER'S GUIDE TAOS TEXAS ADVANCED OPTOELECTRONIC SOLUTIONS®

## TSL4531 LIGHT-TO-DIGITAL COLOR LIGHT SENSOR EVALUATION SYSTEM

*Oct 2011*



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## INITIAL HARDWARE SETUP

The software should be installed prior to connecting any hardware to the computer. Follow the instructions found in the Quick Start Guide (QSG). This will load the required driver for the USB interface and also the graphical user interface (GUI).

The hardware consists of the Controller EVM v2.1 motherboard, the TSL4531 evaluation daughterboard, USB Flash Drive and a USB interface cable.



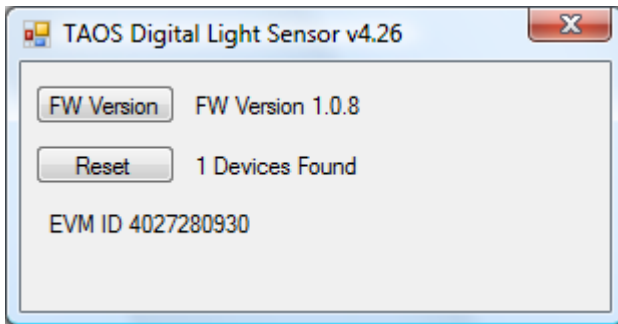
When the USB cable is connected the green LED should light up indicating that power is being received via the USB interface, and the controller board processor is running. If the green LED does not light up check the USB cable connections, unplug the USB cable and try again. If after re-try there is no green LED check the PC for USB error messages. See the resources section at end of this document for additional assistance.

## ESTABLISHING BASIC FUNCTIONALITY

The software should be started using the desktop icon "TAOS DigitalLightSensor v4\_xx" or by double clicking the "TAOS DigitalLightSensor v4.30.exe" file from the installation directory. The default installation directory path is:

C:\Program Files\TAOS\TSL4531EVM                      Windows 32 bit operating systems  
 C:\Program Files (x86)\TAOS\TSL4531EVM            Windows 64 bit operating systems

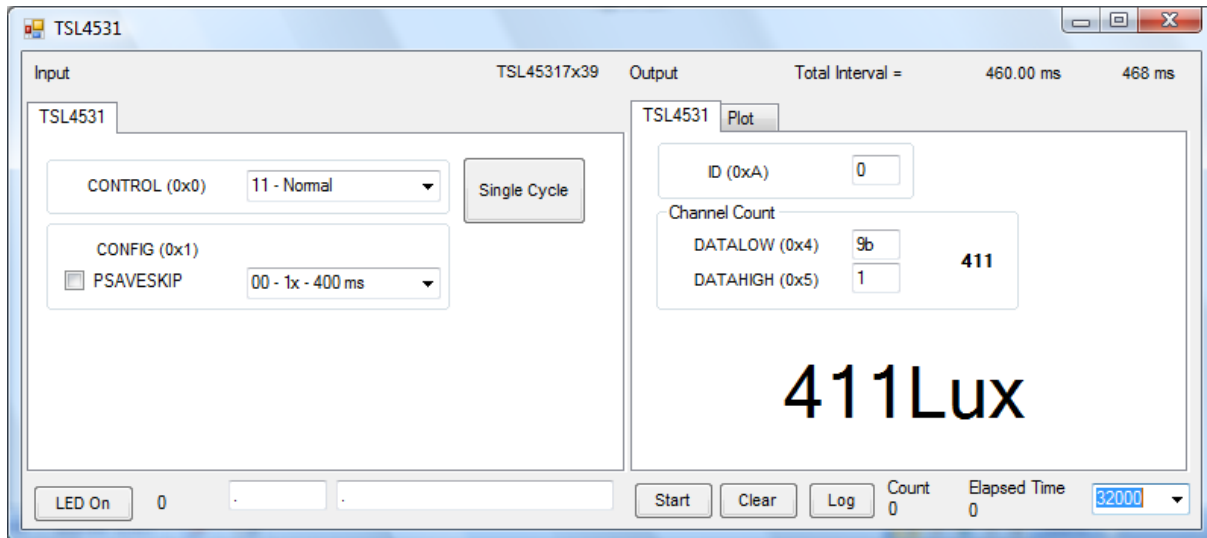
Although a different installation path may have been selected by the user during the installation process. When started, the following windows will open on the PC. The bottom window is the main user interface "child window" and should be positioned on the screen for easy access. The top window "parent window" is not typically needed and may be placed out of the way. This window is the parent window (PW) to the child window (CW) and may be used to reset the CW.



Clicking on the red "X" on the PW will close both PW and CW. Clicking on the red "X" on the CW will close only the CW.

The "TSL4531" tabs on both the left and right side of the CW will be selected by default each time the application software is opened. On the right side numbers should be changing showing that the ALS function is operational. By changing the ambient light source or

waving your hand over the sensor at ~4 inch (100mm) separation you should see the ALS readings change correspondingly with the amount of light energy reaching the sensor.



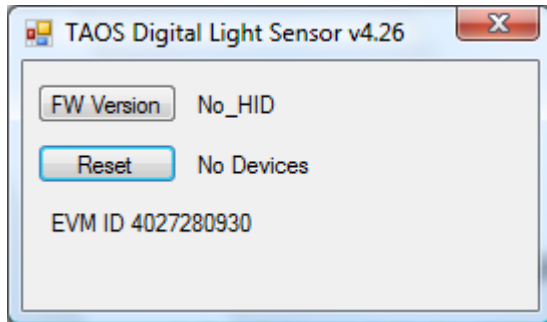
The balance of this document identifies and describes the controls available on the tabs of the GUI. In combination with the TSL4531 datasheet, the quick start guide (QSG) and application notes available on the TAOS website [www.TAOSinc.com](http://www.TAOSinc.com), there should be enough information to allow thorough evaluation of the TSL4531 device.

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## TSL4531 EVM GRAPHICAL USER INTERFACE (GUI)

### SOFTWARE OVERVIEW

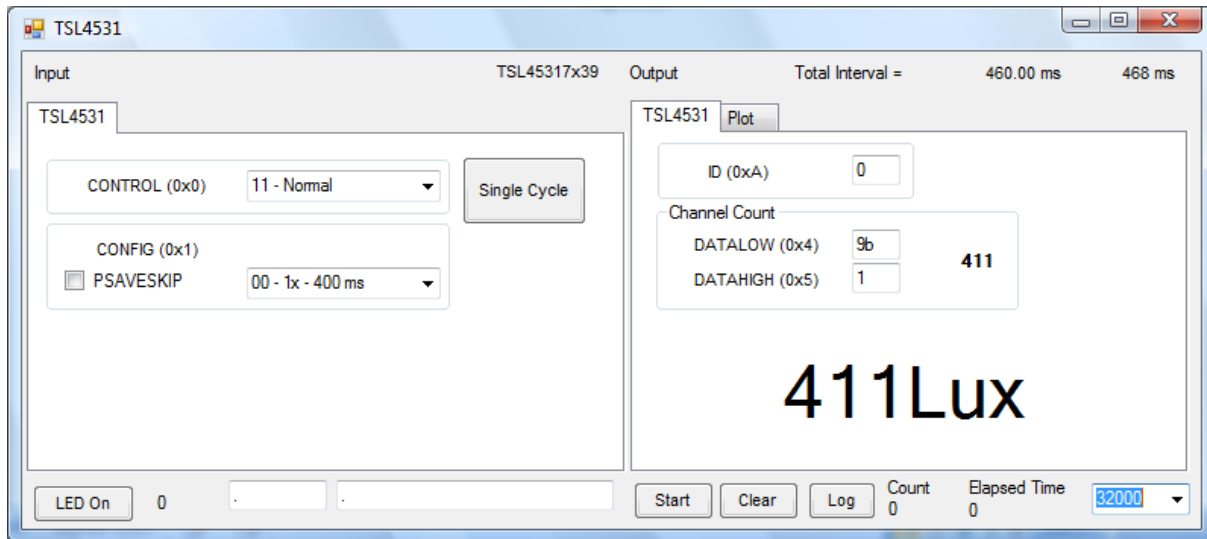
On initialization the software displays two windows – a smaller “TAOS Digital Light Sensor” window and a larger window containing controls pertinent to the device connected.



If “No Devices” appears, verify that the daughterboard is connected to the motherboard properly. If “No\_HID” appears, verify the USB cable is connected. A green LED on the motherboard indicates that the USB cable is connected and providing power to the system.

The “Reset” button can be pressed or the software can be restarted to reinitialize the system.

The CW contains the user interface with control buttons, fields, selection boxes and output values for the identified device connected. Tabs are used to make control and evaluation of specific device functions easy. For the TSL4531 devices the initial display screen appears as shown here:

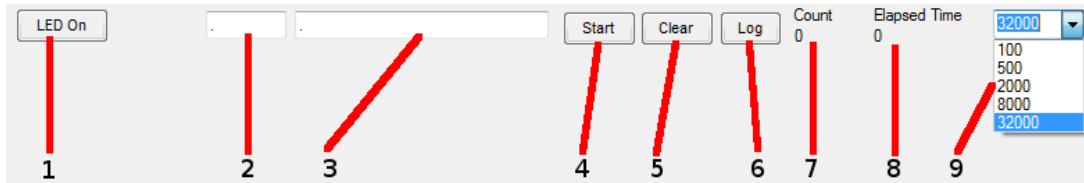


This window has inputs organized on the left, and outputs organized on the right. Values for input register variables may be set by changing any of the input parameters. The Output Register tab allows output register values to be viewed. The Plot tabs provide output data plotting capability.

The values shown in this document will not exactly match a users system but the basic window and controls should be identical. This document will identify the usage and operation of these items in detail.

Always visible along the bottom are the following controls:

- LED Off – ON/OFF/ON toggle for the green controller board LED. This LED is a good power-on indicator but can introduce errors in the optical tests. Therefore, it is recommended for accurate measurements to turn the LED off.
- A section containing logging controls and sampling status information:



1. Toggles LED on the controller board.
2. Text entered here is appended to the default file name. The file name contains the Part Name and address shown in the large "Child" window, an underscore "\_" and the text entered. The default if nothing is entered is a period(".").
3. Secondary comment box. Text entered here is also appended to the log file name. . The default if nothing is entered is a period(".").

Sample:

TSL45317x39\_Testing\_1-2-3\_Log.txt

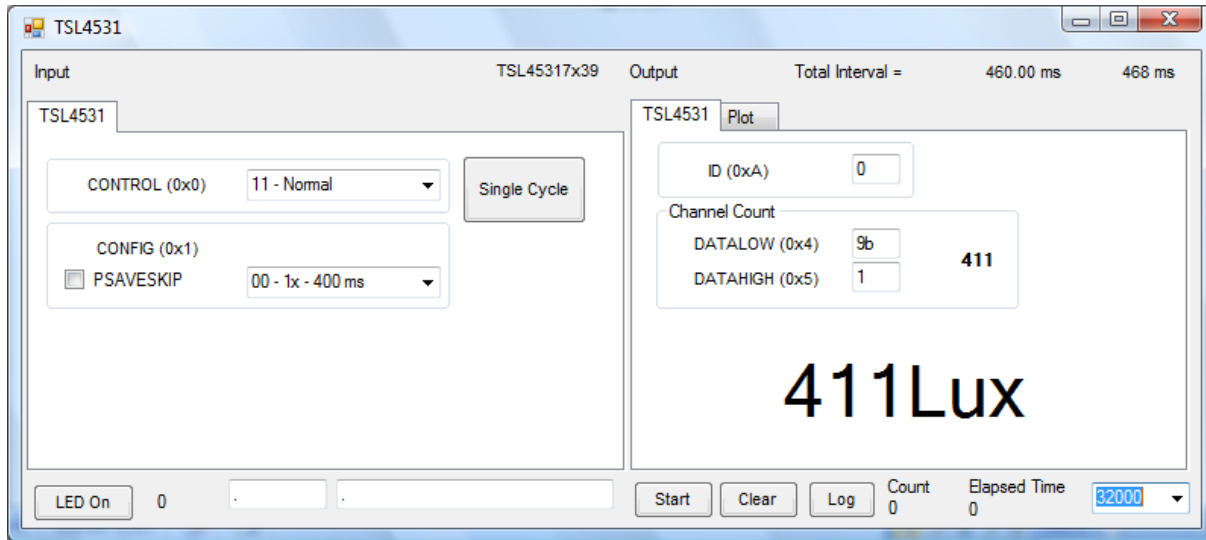


- From TAOS\_DigitalLightSensor.exe
- From User input

4. The start button tells the program to start logging. The fields entered in #2 and #3 will be used as field names in the output. If you change the values in #2 or #3, the corresponding field names will change in the output beginning at the time of the change, but the log file name will not change after logging is started.
5. Clear –The Clear button will flush the previous optical sample readings and reset the elapsed time indicator (see #7).
6. Log – Creates a text log file with data. The name will be assigned as explained in #3. This will cause the system to write out any data currently in the log buffer.
7. Count of samples in the log buffer. When that number reaches the limit selected in #9, the system will show a file dialog to save the log in a named file.
8. The elapsed time since the beginning of logging data.
9. The number of log samples to collect before log entry is written to the log file.

## INPUT SIDE, “TSL4531” TAB

The TSL4531 control and config registers may be updated via the input TAB.

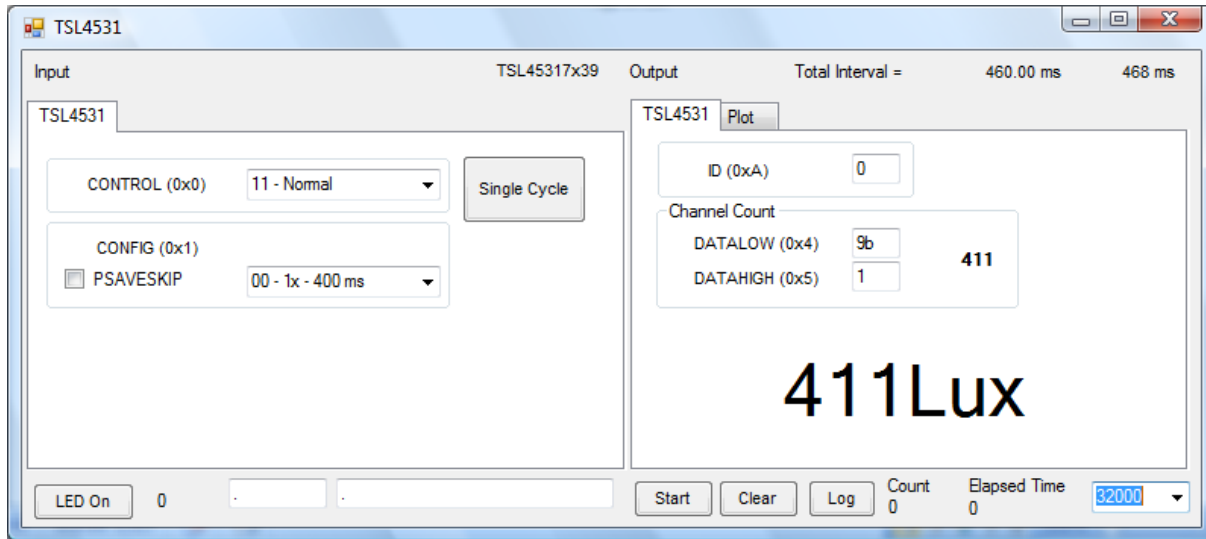


### ALS SENSOR

- **Control** - The control pull-down allows the user access to the device mode settings in the Control Register (0x00). The device can be set to Normal mode which means the device will run continuous. The device can also be set to single mode which means the device will run once and go into power down mode automatically. The device can be set to power down mode manually.
- **Config** – The config pull-down allows the user to set the integration time to 100, 200, or 400 ms.
- **Psaveskip** – This bit is located in the config register and allows the user skip power save states within the device. When the checkbox is checked the power save states are skipped so the total time for integration is equal to the time set in the config register. When psaveskip is unchecked, the total time for integration has an additional time of (60 ms / multiplier).

NOTE: When the Control register is set to single mode, if config value is changed, the single Cycle button must be pressed to update the LUX value. Otherwise the data register holds the last sensor reading from the previous single cycle which could be from a different integration time, thus causing the LUX reading to display inaccurately.

Note: The single cycle button may be pressed to change the device mode to single cycle, or to run another single cycle at any time.

**\_OUTPUT SIDE, “TSL4531” TAB**

The value of internal ID and data registers are displayed on this tab. No register values can be written on the output tab.

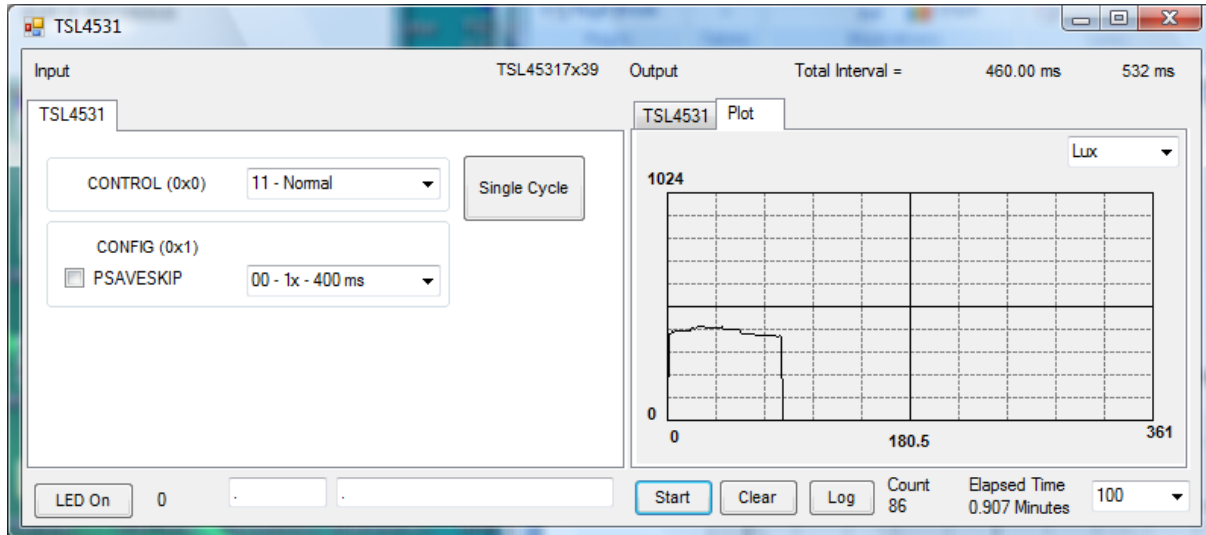
The DATALOW and DATAHIGH are the lower and upper byte register values respectively representing the output lux value of the sensor.

- ID (0x0A) – The ID register provides the identification number for the device.
- DATA (0x04, 0x05):
  1. DATALOW (0x04) – The lower byte of the sensor lux value.
  2. DATAHIGH (0x05) – The upper byte of the sensor lux value.

The lux value is read in hexadecimal from the data registers. The value has been converted and displayed in decimal format within the software output tab.

## OUTPUT SIDE, “PLOT” TAB

The output lux value can be plotted vs. sample point on the graph in the plot tab.



The graph shows all outputs for a static system. The X-axis plots 361 sample points then rolls over back to 1 on the graph. The Y-axis is set to range 0 to 1024; this range cannot be adjusted. However multipliers/dividers (selected from the pull-down list box) may be used to scale the lux display value accordingly.

## RESOURCES

TSL4531 datasheet (included with EVM media)  
 Quick Start Guide (QSG included with EVM media)  
 Application Notes (available from website)

For additional information regarding the TSL4531, please refer to the datasheet. For information regarding the installation of the TSL4531 EVM host application please refer to the Quick Start Guide.

Application notes dealing with various aspects of optical measurement and optical measurement applications are available.

All content is available on the TAOS website [www.TAOSinc.com](http://www.TAOSinc.com)