

ams TSL2585 EVM Miniature Ambient Light Sensor with UV and Light Flicker Detection User Guide

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Introduction

The TSL2585 incorporates Photopic, IR and UV photodiodes that are connected to 3 modulators, provides concurrent ambient light sensing, UV sensing and light flicker detection. The device comes in a low-profile and small footprint, L2.0 mm x W1.0 mm x H0.35 mm OLGA package.

Kit Content

Figure 1:
Evaluation Kit Contents



No	Item	Description
1	TSL2585 Daughter Card	PCB with TSL2585 sensor installed
2	EVM Controller Board	Used to communicate USB to I2C
3	USB Cable (A to Micro-B)	Connects EVM controller to PC
4	Flash Drive	Include application installer and documents

Ordering Information

Ordering Code	Description
TSL2585 EVM	Miniature Ambient Light Sensor with UV and Light Flicker Detection

Getting Started

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

The balance of this document identifies and describes the controls available on the GUI. In combination with the TSL2585 datasheet, the QSG and application notes available on the ams website, ams.com, there should be enough information to allow evaluation of the TSL2585 device.

Hardware Description

The hardware consists of the EVM Controller, the TSL2585 EVM daughter card, and a USB interface cable. The EVM controller board provides power and I2C communication to the daughter card through a seven-pin connector. When the EVM controller is connected to the PC through USB, a green LED lights on to indicate the system is getting power.

For schematics, layout and BOM information please see the documents included with the install located in the TSL2585 EVM folder (All Programs -> ams-OSRAM -> TSL2585 EVM -> Documents).

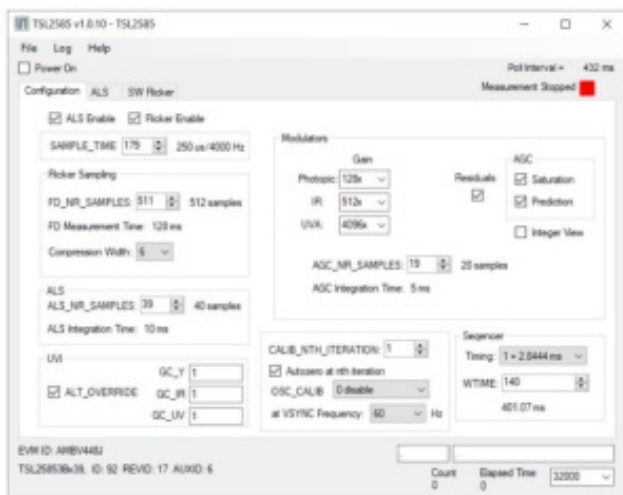
Figure 2:
Evaluation Kit Hardware



Software Description

The main window (Figure 3) contains the system menus, system level controls, device information and logging status. The Configuration tab contains controls to setup both ALS and Flicker detection parameters. Both ALS tab and SW Flicker tab display ALS and Flicker data. The ALS tab contains a plotting area in which raw ALS data is drawn. The SW Flicker tab contains a plotting area in which the flicker raw data and flicker frequency after FFT calculation are drawn. The application polls the ALS and flicker raw data continuously and calculates flicker frequency values.

Figure 3:
GUI Main Window



Connect Software to Hardware

On startup, the software automatically connects to the hardware. On successful initialization, the software displays a main window, containing controls pertinent to the connected device. If the software detects an error, an error window appears. If “Device not found or is unsupported” appears, verify the correct daughterboard is properly connected to the EVM controller board. If “Cannot connect to EVM board” appears, verify the USB cable is connected. When the EVM controller board is connected to the USB, a green LED lights on power up to indicate the USB cable is connected and providing power to the system. The LED will remain lit until the any software application opens the controller. The light will then be switched off so that it will not interfere with any light measurements.

If the EVM board disconnects from the USB bus while the program is running, it displays an error message and then terminates. Reconnect the EVM board and restart the program.

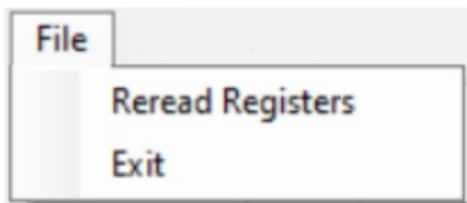
System Menus

At the top of the window there are pull-down menus labeled “File”, “Log”, and “Help”. The File menu provides basic application-level control. The Log menu controls the logging function, and the Help menu provides version and copyright information for the application.

File Menu

The File menu contains the following functions:

Figure 4:
File Menu



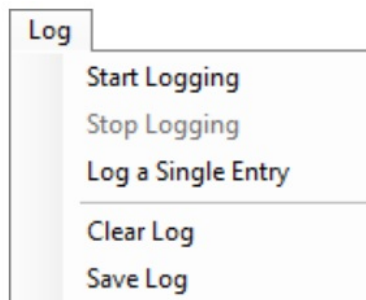
The Reread Registers function forces the program to re-read all of the control registers from the device and display them on the screen. This does not read the output data, because the program reads those registers continually while it is running.

Click on the Exit command to close the main window and terminate the application. Any unsaved log data is cleared from memory. The application can also be close by clicking the red “X” in the upper right hand corner.

Log Menu

The Log menu controls the logging function and saves the log data to a file. Log data accumulates in memory until discarded or written to a data file.

Figure 5:
Log Menu



Click Start Logging to start the logging function. Each time the program polls the output information from the device, it creates a new log entry showing the raw data values, the values of various control registers, and the values entered by the user into the text fields near the bottom right corner of the window.

Click Stop Logging to stop the logging function. Once logging stops, the user may store the data in a file, or continue collecting additional data by clicking Start Logging again.

The Log a Single Entry command causes logging to start, collect one single entry, and immediately stop again. This function is not available when logging is already running.

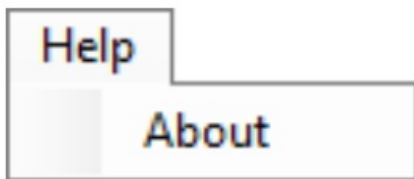
Click Clear Log to discard any previously collected data. If there is data in memory, which has not been saved to disk, this function displays a prompt asking to verify it is OK to discard the data. If the log is active when this function executes, the log continues running after the existing data is discarded.

Click Save Log to save the collected log data to a csv file. This stops the logging function, if it is active, and displays a file dialog box to specify where to store the logged data. The Log Status and Control Information section below describes the default file name, but you may change the file name if desired.

Help Menu

The Help menu contains a single function: About.

Figure 6:
Help Menu



The About function displays a dialog box (Figure 7) showing the version and copyright information for the application and library. Click the OK button to close this window and continue.

Figure 7:
About Window



System Level Controls

Immediately below the top menu bar there are checkboxes used to control the system level functions of the TSL2585 device.

The Power On checkbox controls the PON function of the TSL2585. When this box is checked, the power is on and the device is running measurements according the settings in the Configuration tab. At this time, the Configuration tab is disabled to prevent users to change the settings while the measurement is on going. When this box is unchecked, the power is off and the device does not operate. The Configuration tab is enabled and you can change the controls to setup the parameters for next running.

Auto Polling

The application automatically polls the TSL2585 raw data of ALS and Flicker if enabled. The Poll Interval at the right upper corner of the form displays the actually time between reads of the device.

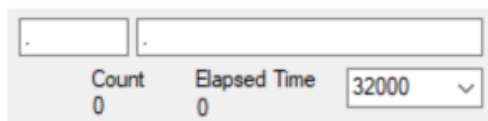
Device ID Information

The lower left corner of the window displays the ID number of the EVM Controller board, identifies the device being used.

Log Status and Control Information

The lower right corner of the window contains status information and controls for the logging function:

Figure 8:
Logging Status

The screenshot shows a section of the application interface for logging status. It contains two empty text input boxes at the top. Below them, the word 'Count' is displayed above the number '0'. To the right, the words 'Elapsed Time' are displayed above the number '0'. Further right is a pull-down menu showing the value '32000' with a downward arrow icon.

This section contains text boxes that are stored in the log file data and used to build the file name for the log file. If the data in these fields are changed, the new values are stored with any new data logged. The default file name is based on these values at the time the log file is written. If nothing is entered in these boxes they default to a period (“.”).

Sample default file name:

TSL2585_1-2-3_Log_HH_MM_SS.csv

From Application

From User Input

The Count value displayed is a count of the number of samples currently in the log buffer.

The Elapsed Time value indicates the elapsed time since data logging started.

The numeric box in the bottom right-hand corner sets a limit to the size of the collected dataset. You may select a value from the pull-down list, or enter a value manually. When the number of entries in the log reaches this value, the program will automatically stop logging and display a file dialog box to specify where to store the logged data. You may change the file name if desired. The maximum value that may be entered in this field is 32000.

“Configuration” Tab

The main portion of the screen contains a tab labeled Configuration.

Figure 9:
Configuration Tab



Configuration Controls

ALS Enable control enables the ALS detection if checked.

Flicker Enable control enables the Flicker detection if checked.

The SAMPLE TIME control sets the time of one flicker measurement. It also defines the measurement time of the step for ALS measurements.

The Flicker Sampling group box contains controls relating the flicker detection:

- FD_NR_SAMPLES control defines the number of samples for one flicker measurement.
- FD Measurement Time control displays the integration time for one flicker measurement.
- Compression Width control defines the compressed flicker data width in the FIFO. The choice is from 1 to 15.

The ALS group box contains controls relating the ALS detection:

- ALS_NR_SAMPLES control defines the number of samples for one ALS measurement.
- ALS Integration Time control displays the integration time for one ALS measurement.

The Calibration group box contains the following controls:

- CALIB_NTH_ITERATION control sets the repeat rate of calibration execution in measurement sequencer rounds. The values are from 0 to 255.
- Autozero at nth iteration check box enables auto zero calibration during nth iteration calibration if checked.
- OSC_CALIB control defines calibration mode. The available options are “0 disabled”, “1 after pon”, and “2 always on”.
- At VSYNC Frequency sets VSYNC frequency. The available values are 60 HZ, 90 HZ and 120 HZ.

The Modulators group box contains controls to setup all gains:

- Photopic dropdown combo box sets the gain for channel 0 (Photopic detection). The choices are 1/2x, 1x, 2x, 4x, 8x, 16x, 32x, 64x, 128x, 256x, 512x, 1024x, 2048x, and 4096x.

- IR dropdown combo box sets the gain for channel 1 (IR detection). The choices are 1/2x, 1x, 2x, 4x, 8x, 16x, 32x, 64x, 128x, 256x, 512x, 1024x, 2048x, and 4096x.
- UVA dropdown combo box sets the gain for channel 1 (UV detection). The choices are 1/2x, 1x, 2x, 4x, 8x, 16x, 32x, 64x, 128x, 256x, 512x, 1024x, 2048x, and 4096x.
- AGC group box has two check boxes. One is check box Prediction for enabling the predict AGC function for all steps of the sequence if checked. Another one Saturation check box enables analog saturation AGC if checked.
- Residual check box enables a residual measurement on all modulators if checked.
- AGC_NR_SAMPLES defines the number of samples for every AGC measurement. The values are from 0 to 2047.
- AGC Integration Time displays the AGC integration time.

The Sequencer group box contains controls relating the wait function:

- Timing (MOD_TRIGGER_TIMMING) defines the repeat rate of modulator/sequencer measurements. The available selections are “0 off”, “1 normal = 2.84 ms”, “2 long = 45.51 ms”, “3 fast = 88.89 μ s”, “4 fastlong = 1.42 ms”, “5 vsync”.
- WTIME specifies the time to wait between measurement steps. The values are from 0 to 255.

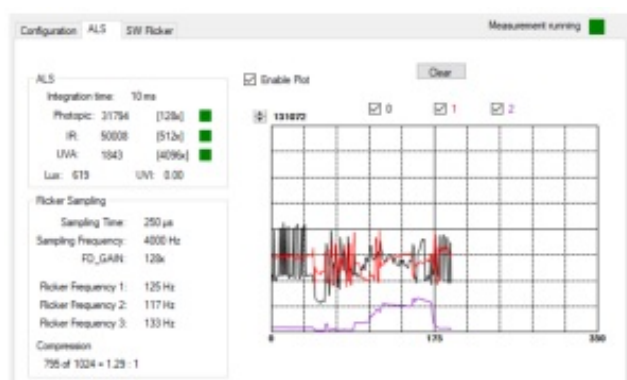
The UVI group box contains controls relating the UVI calculation:

- ALT_OVERRIDE check box will use the typical equation to calculate the UVI when checked. This works for typical indoor and outdoor conditions. When it is unchecked, the UVI calculation will use another set of constants in the equation, and it usually works better when testing indoors with special UV bulbs.
- GC_Y, GC_IR, GC_UV are the golden calibration factors for Y, IR, UV. These could also be entered through the GUI as an adjustment factor. Any other device will need their own.

“ALS” Tab

The main portion of the screen contains a tab labeled ALS. It displays measurement data.

Figure 10:
ALS Tab



ALS Group Box

The left upside of the ALS tab displays the ALS measurement data. The flowing items are displayed:

- The ALS Integration Time.
- Photopic data counts.
- IR data counts.
- UVA data counts.
- Photopic gain value.
- IR gain value.
- UVA gain value.
- Photopic Saturation status: Green color means no saturation happened. Red otherwise.
- IR Saturation status: Green color means no saturation happened. Red otherwise.
- UVA Saturation status: Green color means no saturation happened. Red otherwise.
- Lux: Calculated Lux value.
- UVI: Calculated UVI value

Flicker Sampling Group Box

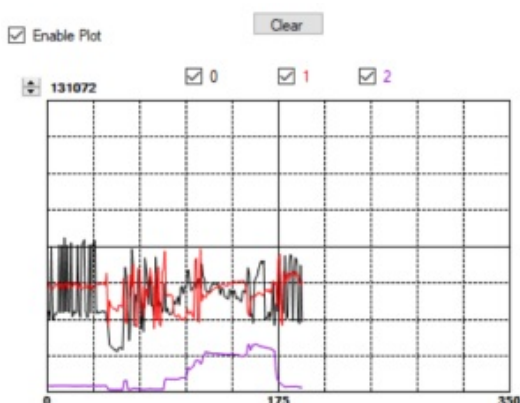
The flowing items display in the Flicker Sampling group box:

- Sampling Time.
- Sampling Frequency.
- FD_GAIN.
- Flicker Frequency1, which has the biggest FFT value.
- Flicker Frequency2, which has the second biggest FFT value.
- Flicker Frequency3, which has the third biggest FFT value.

ALS Data Plot

The remaining portion of the ALS tab is used to display a running plot of the collected ALS values. The last 350 values are collected and plotted on the graph. As additional values are added, the old values will be deleted from the left side of the graph. To start the plotting function, check the Enable Plot checkbox and select the 0, 1 and/or 2 checkboxes. Clear button will clear the plot on screen and restart new plot.

Figure 11:
ALS Data Plot

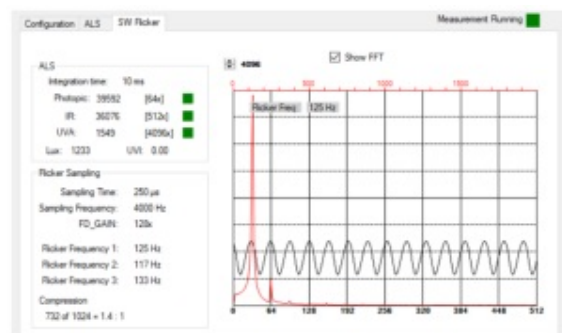


The scale of the Y-axis of the plot can be adjusted by clicking on the small up and down arrows at the top left corner of the plot. The scale can be set to any power of 2 from 64 through 65536.

“SW Flicker” Tab

The main portion of the screen contains a tab labeled SW Flicker.

Figure 12:
SW Flicker Tab



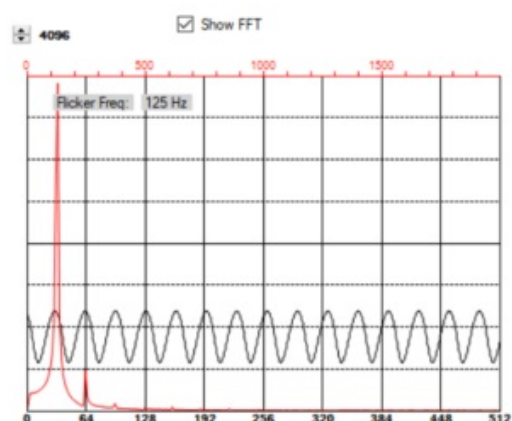
Flicker Information

The left side of the SW Flicker tab displays the ALS and Flicker information same as those in the ALS tab. See “ALS Tab” section for detail information.

Flicker Output Data

The top right portion of the SW Flicker tab displays plot of the original flicker data and the data after FFT. Besides, the peak Flicker Frequency is also displayed there.

Figure 13:
SW Flicker Data Plot



The scale of the Y-axis of the plot can be adjusted by clicking on the small up and down arrows at the top left corner of the plot. The scale can be set to any power of 2 from 16 to 16384.

Resources

For additional information regarding the TSL2585, please refer to the datasheet. For information regarding the

installation of the TSL2585 EVM host application software please refer to the TSL2585 EVM Quick Start Guide.

Designer's Notebooks dealing with various aspects of optical measurement and optical measurement applications are available. All content is available on the ams website ams.com.



For further information, please refer to the following documents:

- TSL2585 Datasheet
- TSL2585 EVM Quick Start Guide (QG001010)
- TSL2585 EVM User's Guide (this document)
- TSL2585 EVM Schematic Layout

Revision Information

Changes from previous version to current revision v2-00/Page

Updated Figure1, Figure2, Figure3, and Figure9: 3, 5, 6, and 11

Correct a spelling error: 12

Add UVI group box description.: 12

- Page and figure numbers for the previous version may differ from page and figure numbers in the current revision.
- Correction of typographical errors is not explicitly mentioned.

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Documents / Resources

 TSL2585 TSL2585 EVM Miniature Ambient Light Sensor with UV and Light Flicker Detection	ams TSL2585 EVM Miniature Ambient Light Sensor with UV and Light Flicker Detection [pdf] User Guide TSL2585 EVM, Miniature Ambient Light Sensor with UV and Light Flicker Detection, TSL2585 EVM Miniature Ambient Light Sensor with UV and Light Flicker Detection
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