



User Guide

UG001002

TMD2636

TMD2636 EVM

Miniature Proximity Sensor Module

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1 Introduction

The TMD2636 evaluation kit comes with everything needed to evaluate the TMD2636. The device features advanced proximity measurement in a tiny and extremely thin optical land grid array module.

1.1 Kit Content

Figure 1:
Evaluation Kit Contents



No.	Item	Description
1	TMD2636 Daughter Card	PCB with TMD2636 sensor installed
2	EVM Controller Board	Used to communicate USB to I ² C
3	USB Cable (A to Micro-B)	Connects EVM controller to PC
4	Flash Drive	Include application installer and documents

1.2 Ordering Information

Ordering Code	Description
TMD2636 EVM	Miniature Proximity Sensor Module

2 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).

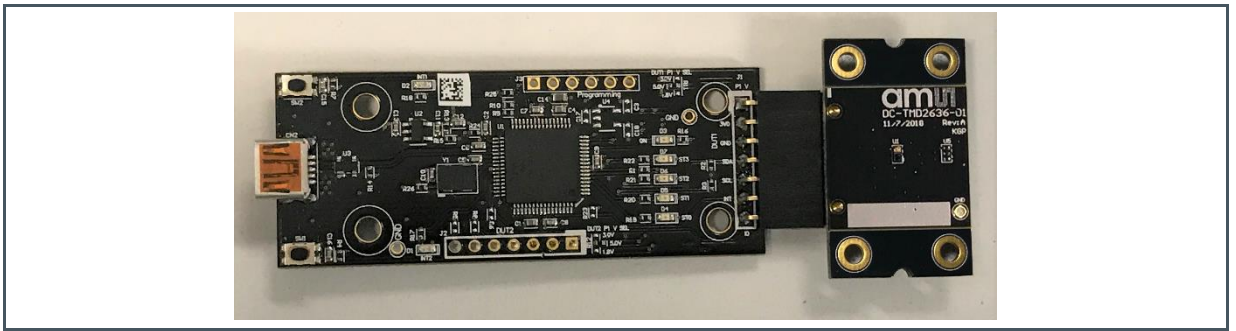
The balance of this document identifies and describes the controls available on the GUI. In combination with the TMD2636 datasheet, the QSG and application notes available on the **ams** website, www.ams.com, there should be enough information to allow evaluation of the TMD2636 device.

3 Hardware Description

The hardware consists of the EVM Controller, the TMD2636 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 TMD2636 EVM folder (All Programs -> ams -> TMD2636 EVM -> Documents).

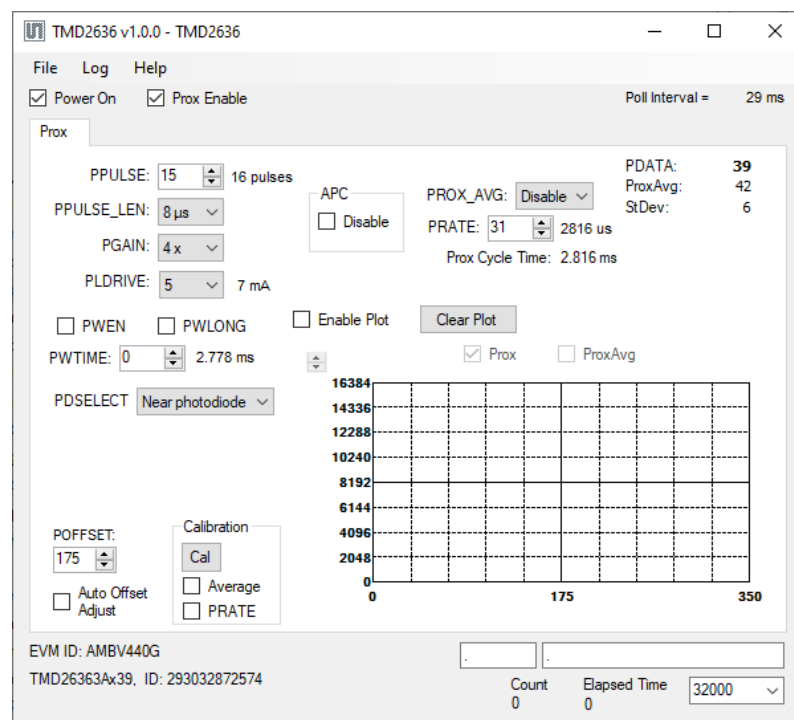
Figure 2:
Evaluation Kit Hardware



4 Software Description

The main window (Figure 3) contains the system menus, system level controls, device information and logging status. The main window contains only one tab “Prox” to configure the parameters to run proximity. The prox data and its average data is also plotted in this tab. The application polls the prox raw data continuously.

Figure 3:
GUI Main Window



4.1 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.

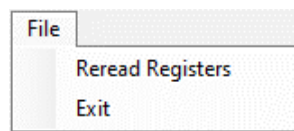
4.2 System Menus

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.

4.2.1 File Menu

The File menu contains the following functions:

Figure 4:
File Menu



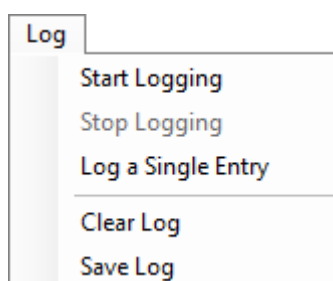
The **Reread Registers** function forces the program to re-read all of the control registers from the device and display them on the screen. This does not read the output data, because the program reads those registers continually while it is running.

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.

4.2.2 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.

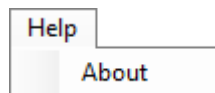
Click **Clear Log** to discard any previously collected data. If there is data in memory, which has not been saved to disk, this function displays a prompt asking to verify it is OK to discard the data. If the log is active when this function executes, the log continues running after the existing data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

4.2.3 Help Menu

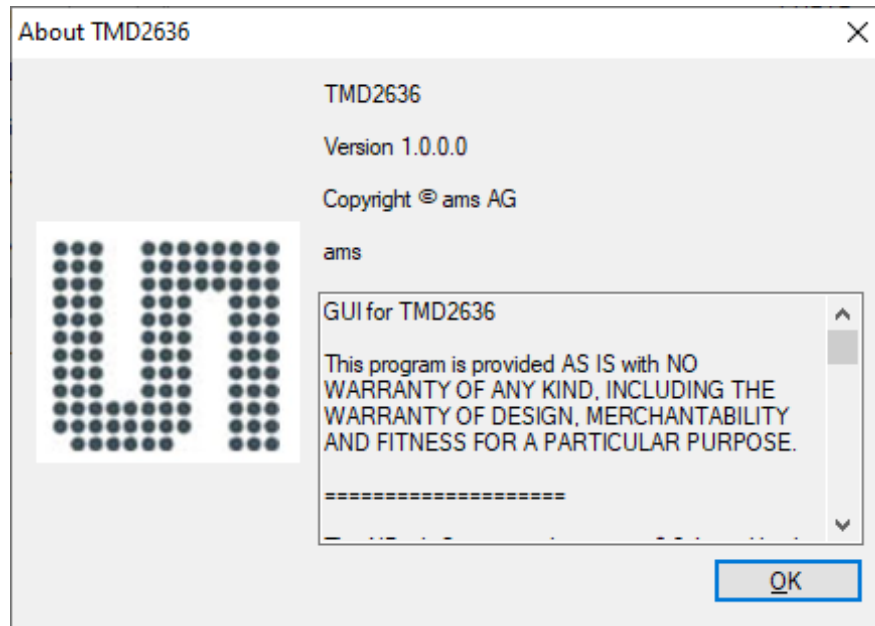
The Help menu contains a single function: **About**.

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



4.3 System Level Controls

Immediately below the top menu bar there are checkboxes used to control the system level functions of the TMD2636 device.

The **Power On** checkbox controls the PON function of the TMD2636. When this box is checked, the power is on and the device is running measurements according the settings in the Prox tab. When this box is unchecked, the power is off and the device does not operate.

The **Prox Enable** checkbox enable the proximity measurement when checked and disable proximity measurement when unchecked.

4.4 Auto Polling

The application automatically polls the TMD2636 raw data of the Prox. The **Poll Interval** at the right upper corner of the form displays the actually time between reads of the device.

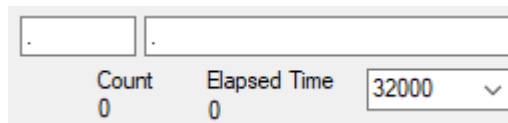
4.5 Device ID Information

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

4.6 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



.	.	
Count	Elapsed Time	32000
0	0	

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:

TMD2636_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.

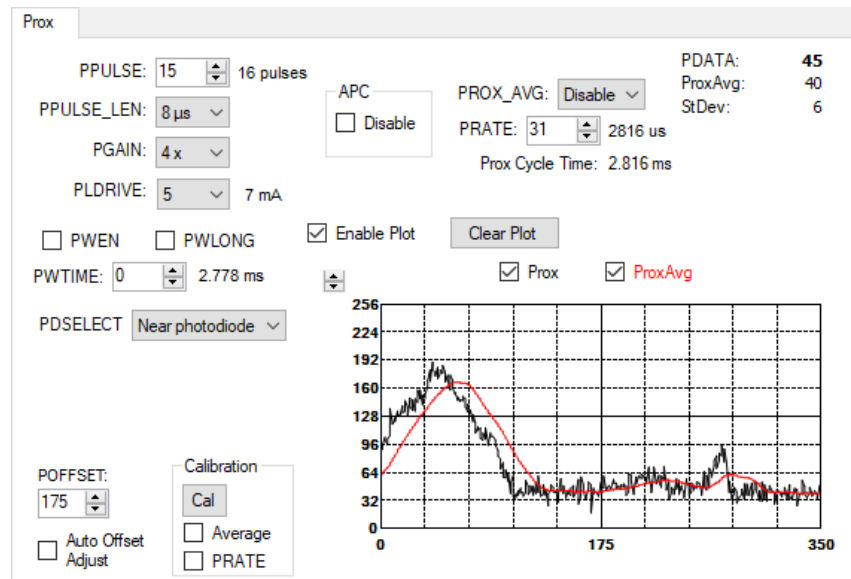
The **Elapsed Time** value indicates the elapsed time since data logging started.

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.

4.7 “Prox” Tab

The main portion of the screen contains a tab labeled Prox. The controls in this tab are divided into 3 sections, each performing a separate function.

Figure 9:
Prox Tab



4.7.1 Prox Controls

The **PPULSE** controls the number of pulses used for each prox cycle. The number of pulses is one more than the PULSE value and is displayed immediately to the right of the box.

The **PPULSE_LEN** control sets the width of all pulses within the proximity cycle. Longer pulses result in increased proximity range and typically result in less electrical noise generated in the analog front end.

The **PGAIN** control is pulldown menus that lets you control the gain stages of the proximity IR sensor. The PGAIN values are 1x, 2x, 4x and 8x.

PLDRIVE control sets the drive strength of the IR VCSEL current. The values are 5,6,7,8 relating the drive current of 7 mA, 8 mA, 9 mA, 10 mA.

The **PWEN** checkbox controls the proximity Wait feature. When this box is checked, the values for PWTIME and PWLONG determine the time between proximity cycles. When this box is unchecked, there is no wait period between proximity cycles and the values of PWTIME and PWLONG are ignored.

The **PWTIME** control sets the time to wait between prox cycles. PWTIME can be adjusted in 2.778 ms steps.

The **PWLONG** checkbox controls the PWTIME factor. When this box is checked, the wait time between proximity cycles increases by a factor of 12x.

The **PDSELECT** selects the photodiode to use for proximity detection. The values are “No photodiode”, “Far photodiode”, “Near Photodiode”, and “Both photodiode”.

The **POFFSET** controls shift PDATA to remove crosstalk from the proximity data. The values range from -255 to 255. This value can be set manually, or it can be set by the Proximity offset calibration.

The **Auto Offset Adjust** checkbox enables the function that automatically decrements the POFFSET value any time the PDATA value is 0. When this function is active, manual changes to the POFFSET control are disabled, and the program will read and update the POFFSET value each time it reads the PDATA value.

The **Calibration** Group box.

- The **Cal** button triggers the sensor's proximity offset calibration sequence. This function automatically selects a POFFSET to remove crosstalk from PDATA.
- The **Average** checkbox enables proximity hardware averaging as selected with PROX_AVG during calibration when checked.
- The **PRATE** checkbox enables PRATE during calibration. It is useful when averaging is enabled.

The **APC** function can be turned off with the **Disable** checkbox. This feature is used for hardware configurations with high crosstalk. When Auto Pulse Control is disabled, the range of the PDATA value is 0-1023. When the **Disable** checkbox is unchecked, the range of the PDATA value is 0-65535.

The **PROX_AVG** control defines the number of ADC samples collected and hardware averaged during a proximity cycle.

PRATE controls sets the duration of a single proximity sample. The time is equal to $(PRATE + 1) * 88 \mu s$. The time, in microseconds, is displayed immediately under this control.

4.7.2 Prox Output Data

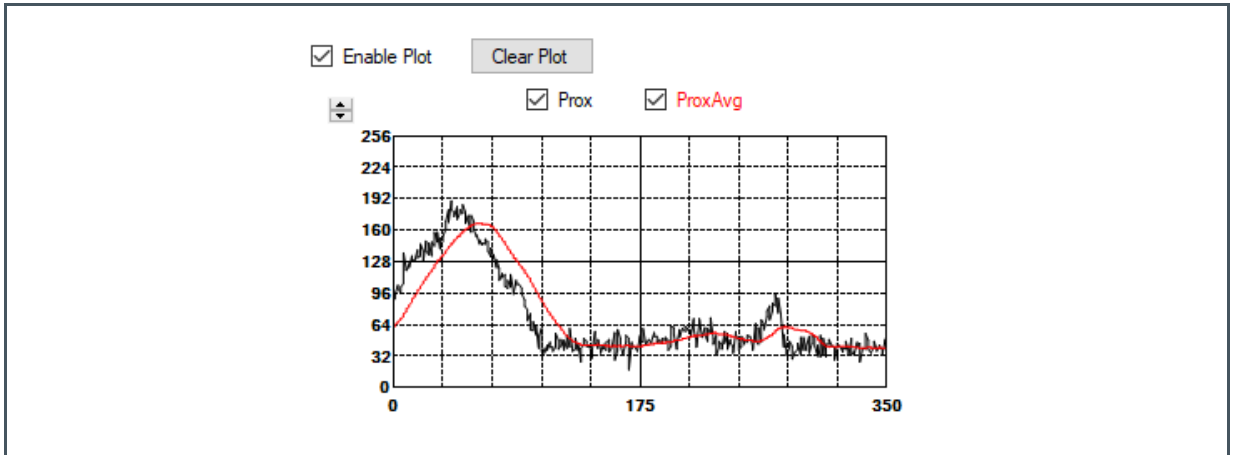
The top right corner of the Prox tab displays the output data. This data is continuously read. The polling interval is shown above the tab.

- **PDATA** displays the Proximity ADC channel data counts.
- **ProxAvg** displays the proximity data after software average of the last 32 PDATA.
- **StDev** displays the calculated standard deviation of the last 32 PDATA samples displayed on the screen

4.7.3 Prox Data Plot

The remaining portion of the Prox tab is used to display a running plot of the collected PDATA and ProxAvg 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.

Figure 10:
Prox Data Plot



5 Resources

For additional information regarding the TMD2636, please refer to the datasheet. For information regarding the installation of the TMD2636 EVM host application software please refer to the TMD2636 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 www.ams.com.



For further information, please refer to the following documents:

- TMD2636 Datasheet
 - TMD2636 EVM Quick Start Guide (QSG)
 - TMD2636 EVM User's Guide (this document)
 - TMD2636 EVM Schematic Layout
-

6 Revision Information

Changes from previous version to current revision v1-00	Page
Initial Release	

- 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.

7 Legal Information

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