A31315 Evaluation Kit User Guide

DESCRIPTION

The A31315 evaluation kit includes everything required to start programming and evaluating A31315 devices. When used in accompaniment with the Allegro sample programmer, it provides easy evaluation and programming of the A31315 devices without the need for any additional hardware or software.

FEATURES

The ASEK daughterboard includes test points for connecting to custom hardware for testing in application. Sockets for single- and dual-die A31315 devices are also included for out-of-the-box evaluation and testing.
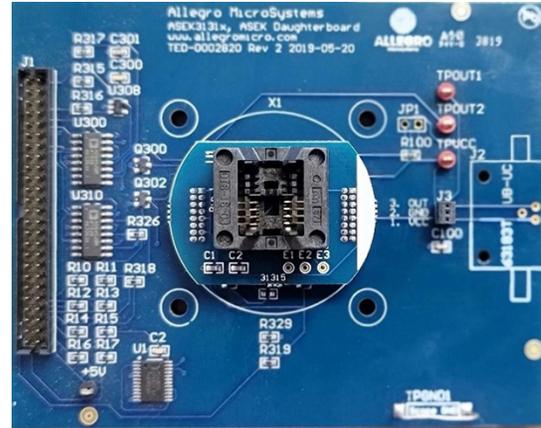
EVALUATION KIT CONTENTS

- ASEK31315 Daughterboard
- A31315 SOIC-8 Single-Die SMT
- A31315 SOIC-8 Single-Die Socket
- A31315 TSSOP-14 Dual-Die SMT
- A31315 TSSOP-14 Dual-Die Socket

Additional Hardware

- ASEK20 Programmer (85-0540)
  □ Included Ribbon Cable
  □ Included Power Supply
  □ Included USB Cable

Figure 1: A31315 Evaluation Kit (Single-Die Socket)

Table of Contents

Table 1: A31315 Evaluation Kit Configurations

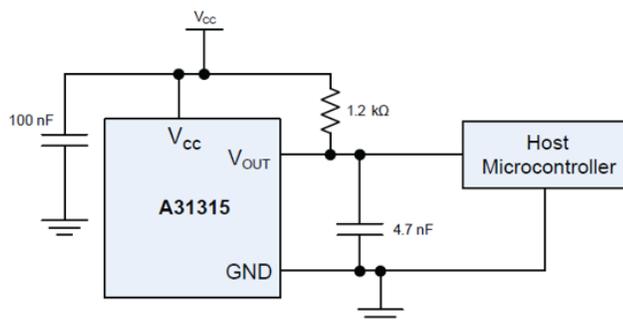| Configuration Name	Part Number	Comments
ASEK31315, Programming Sub-Kit	TED-0003058	Evaluation Kit
ASEK31315, Programming Kit	TED-0003059	Sub-Kit and ASEK Programmer

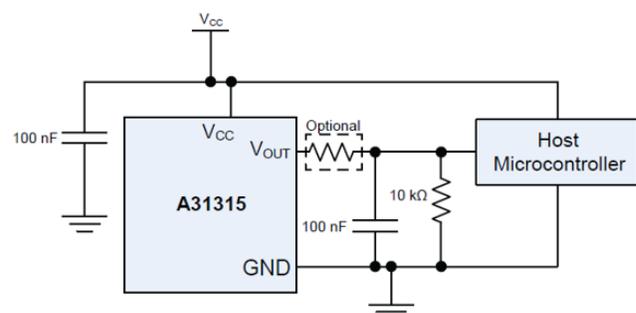**Figure 2: A31315 Typical Application Circuit (Digital Interface)**

Figure 3: A31315 Typical Application Circuit (Analog Interface)

USING THE EVALUATION KIT

This user guide covers the use of the Allegro programming kit and Allegro GUI (graphical user interface) for the A31315. If designing custom hardware and software, refer to the datasheet of the device for details about the communication protocol and electrical requirements.
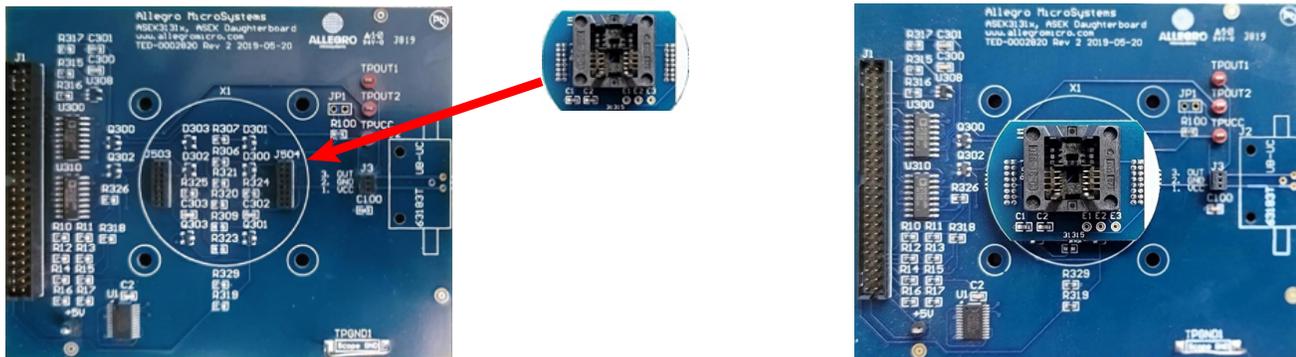
Hardware Setup

The hardware included in the programming sub-kit is sufficient for adding A31315 programming capabilities to an existing ASEK-20 device if one already exists from previous sample programming efforts. If starting from no prior Allegro knowledge or hardware, the Programming Kit includes both the A31315-specific hardware, as well as an ASEK-20 programmer and all required cables.
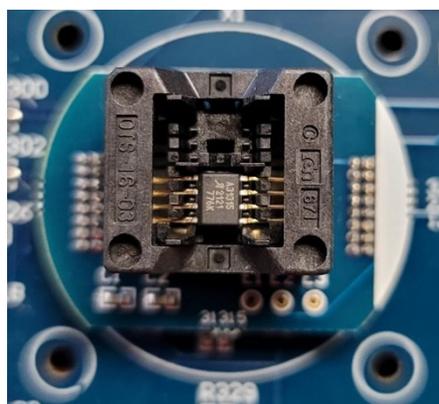
1. Setting up the ASEK-20:

    A. Using the provided power supply, connect the ASEK-20 to the outlet via the "5V" port.

    B. Using the included USB-B cable, connect the ASEK-20 to the computer with the Allegro software using the "USB" port.

    C. Using the included ribbon cable, connect the A31315 daughterboard to the ASEK-20 via the "Device Connection" port.

    D. Switch the "On/Off" switch to the "On" position. The Power LED lights up green to indicate the power connection is good.

Note: The power supply unit includes multiple plug options to support multiple regions, please select and install the relevant plug before connecting to the wall outlet.

2. Setting up the A31315 device:

    A. Plug the A31315 socket board into the daughter board as indicated below. Be careful to align the white strip of the socket board to the right side of the daughter board (left). As an easy reference, the wording and lettering on both boards should both be readable from the same orientation (right).

    B. Insert an A31315 device into the socket. The A31315 device should be placed such that the pin identifier (denoting pin 1) is at the top left.

3. Alternative setup for A31315:

   A. In cases where the A31315 to be tested is in an existing setup such as a custom test fixture or in application PCB/harness, it is possible to bypass use of the socket board and connect the A31315 device to the daughter board directly.

   B. Using the labelled test pins, as well as clip leads (not included), the daughter board provides connection points for the three pins of the A31315.

Software Setup

The Allegro GUIs provided to evaluate magnetic position sensors contain a variety of features to assist in evaluation of devices. For this reason, not all features are covered by this document. The focus of this procedure is to gain familiarity with setting up the GUI to communicate with the A31315 device. For additional information on available GUI features, refer to the user manual on the Allegro Software Portal.

1. Download the A31315 GUI from the Allegro Software portal:

    A. Sign into the Allegro Software Portal: https://registration.allegromicro.com/login#/

    B. Click "Find A Part" to open the "Available Parts" page.

    C. Enter "A31315" into the search box.

    D. Click "View" on the A31315 Position Sensors row:

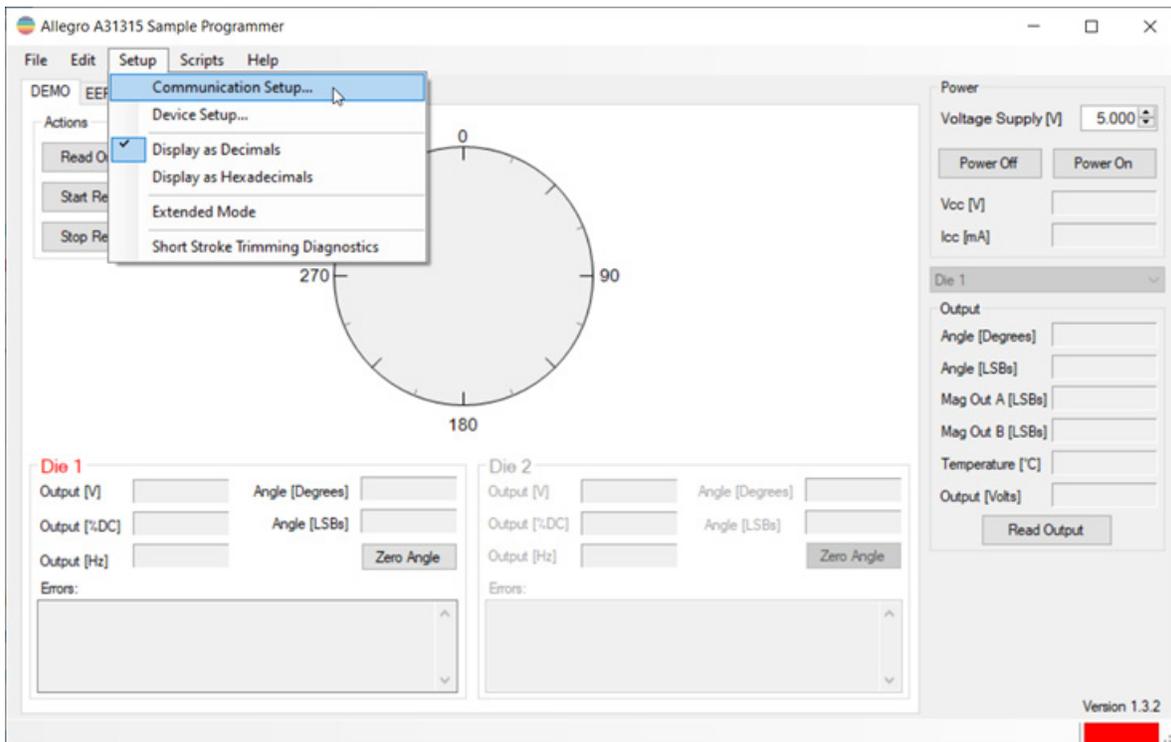   E. Within the A31315 Product page, click the "Download" box for the Programming Application:
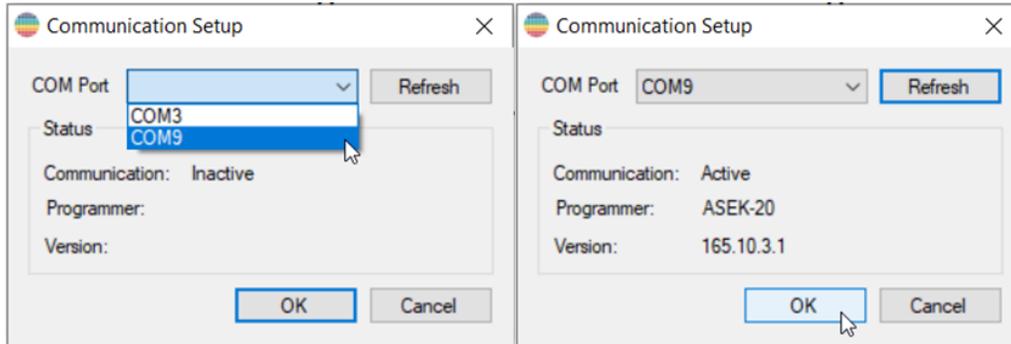
2. Extract the newly downloaded ZIP file.

3. Double click to open the Programmer GUI within the resulting Allegro A31315 Samples Programmer folder.

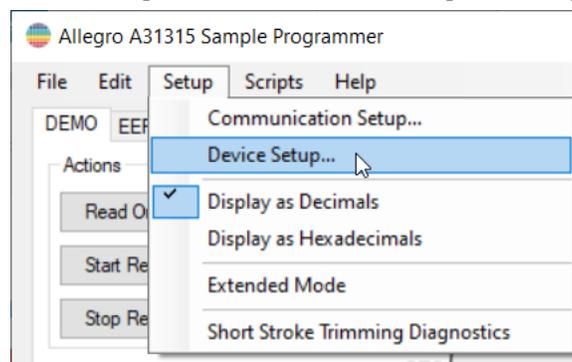| Name	Status	Date modified	Type	Size
A31315.xml	↻	7/5/2023 1:51 PM	XML Document	574 KB
Allegro A31315 Samples Programmer.exe	↻	7/5/2023 1:51 PM	Application	547 KB
Allegro A31315 Samples Programmer.ex...	↻	7/5/2023 1:51 PM	CONFIG File	13 KB
Allegro.dll	↻	7/5/2023 1:51 PM	Application extens...	50 KB
Allegro.Scripting.dll	↻	7/5/2023 1:51 PM	Application extens...	28 KB
Allegro.Support.dll	↻	7/5/2023 1:51 PM	Application extens...	338 KB
ASEK20.dll	↻	7/5/2023 1:51 PM	Application extens...	176 KB
ASEK20_A31315.dll	↻	7/5/2023 1:51 PM	Application extens...	117 KB
ASEKBase.dll	↻	7/5/2023 1:51 PM	Application extens...	110 KB

4. Under the Setup tool bar, click "Communication Setup…". This opens a new pop-up.

5. Select the COM port associated with the ASEK-20 device. Once the correct COM port is selected, the Status info box populates with information about the ASEK firmware. If an incorrect COM port is selected, the GUI attempts to communicate with the port until it ultimately times out.

6. Setup the device communication: Under the Setup tool bar, click "Device Setup…". This opens a new pop-up window.

7. If known, the device setups can be manually entered. Alternatively, the "Auto Detect" button can be used to attempt multiple communication methods and automatically enter the setup details required for communication.
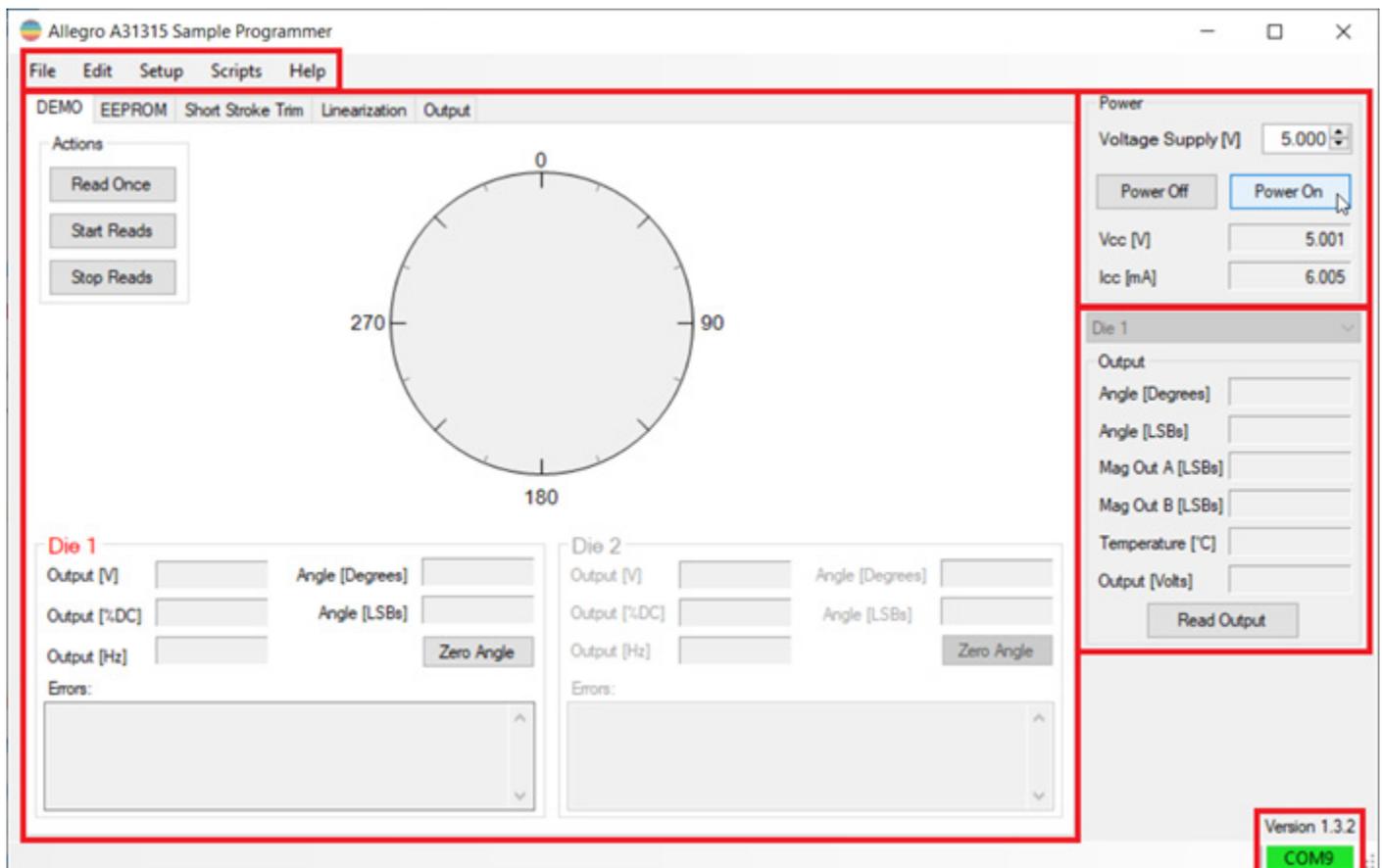

8. Once the Device Setup is finished, the user can power on and communicate with the device.

GUI OPERATION

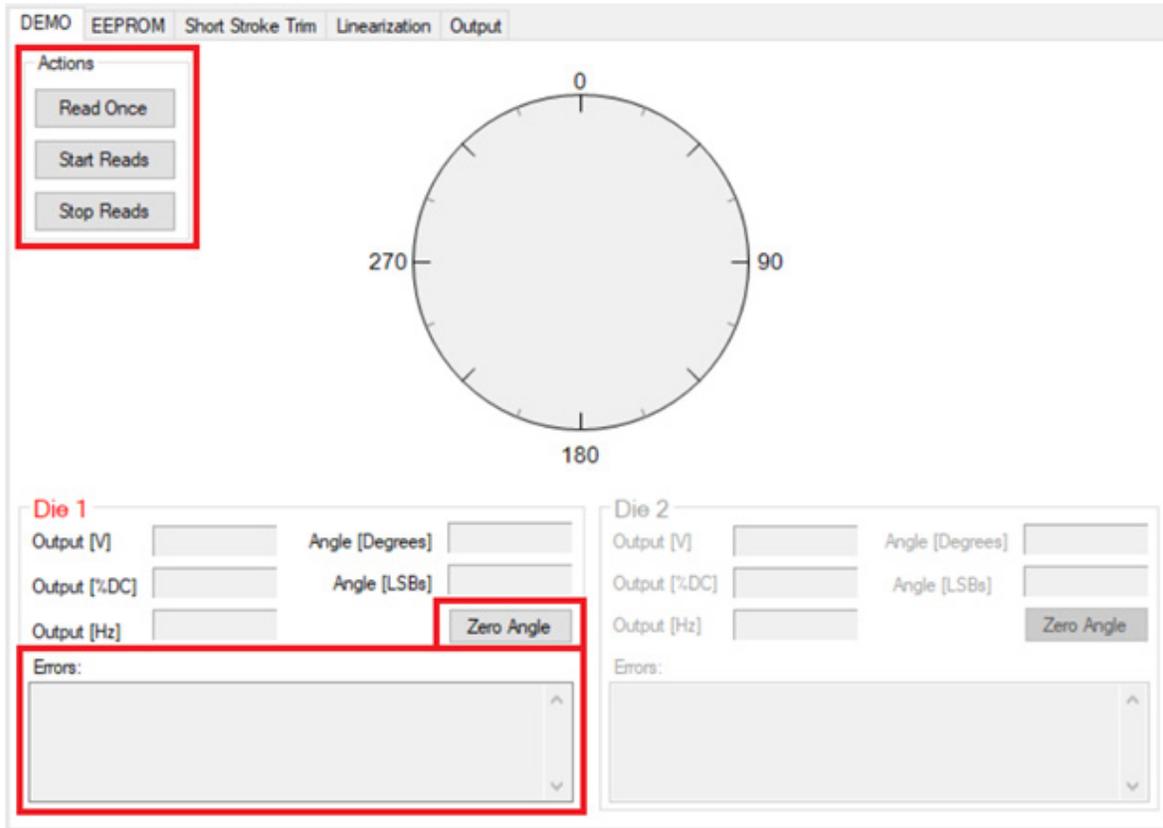The GUI contains a number of specific sections:

1. Tool Bar: Contains advanced settings for the GUI.

2. Tabs: Changes the main section of the GUI based on desired functionality. Each tab is covered by its own section (see Tab Sections).

3. Power: Allows the user to set the target supply voltage, and power-on or off the device.

4. Output: Allows quick reading of typically used device information.

> **Note: Many sections contain a reference to Die 1 as well as Die 2. This is included for dual-die (TSSOP-14) versions of the A31315. For single-die applications, only Die 1 sections are active.**
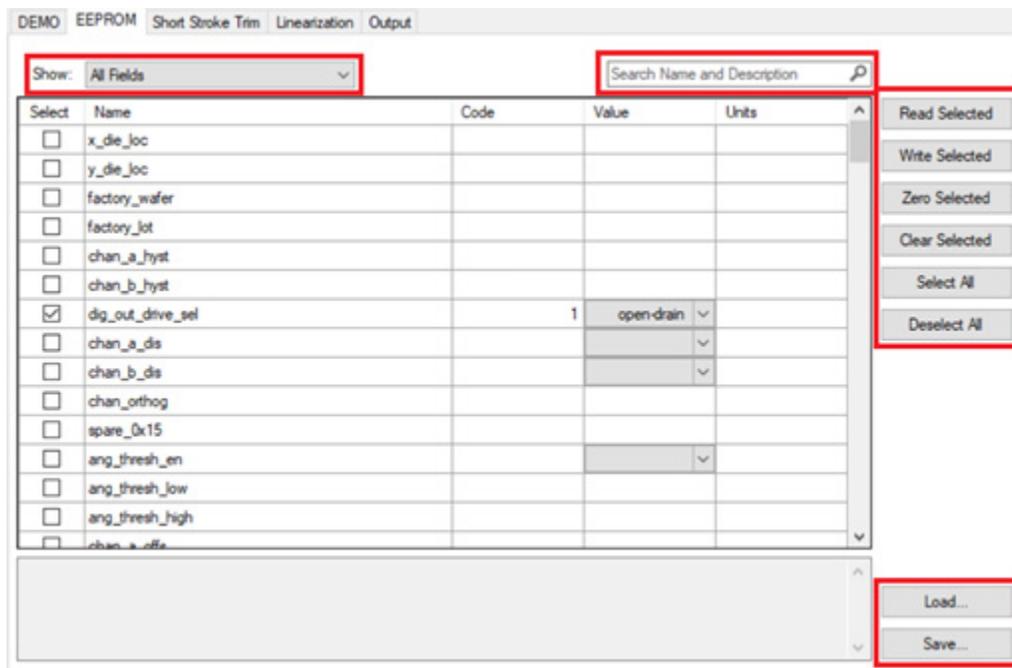
TAB SECTIONS

1. DEMO: Provides a visual representation of the magnetic field applied to the device.

    A. Actions: Includes options to perform a single read "Read Once", begin continuous reads "Start Reads" and end continuous reads "Stop Reads".

    B. Zero Angle: Programs an offset into the device so that the current magnetic field applied reports 0 Deg angle output.

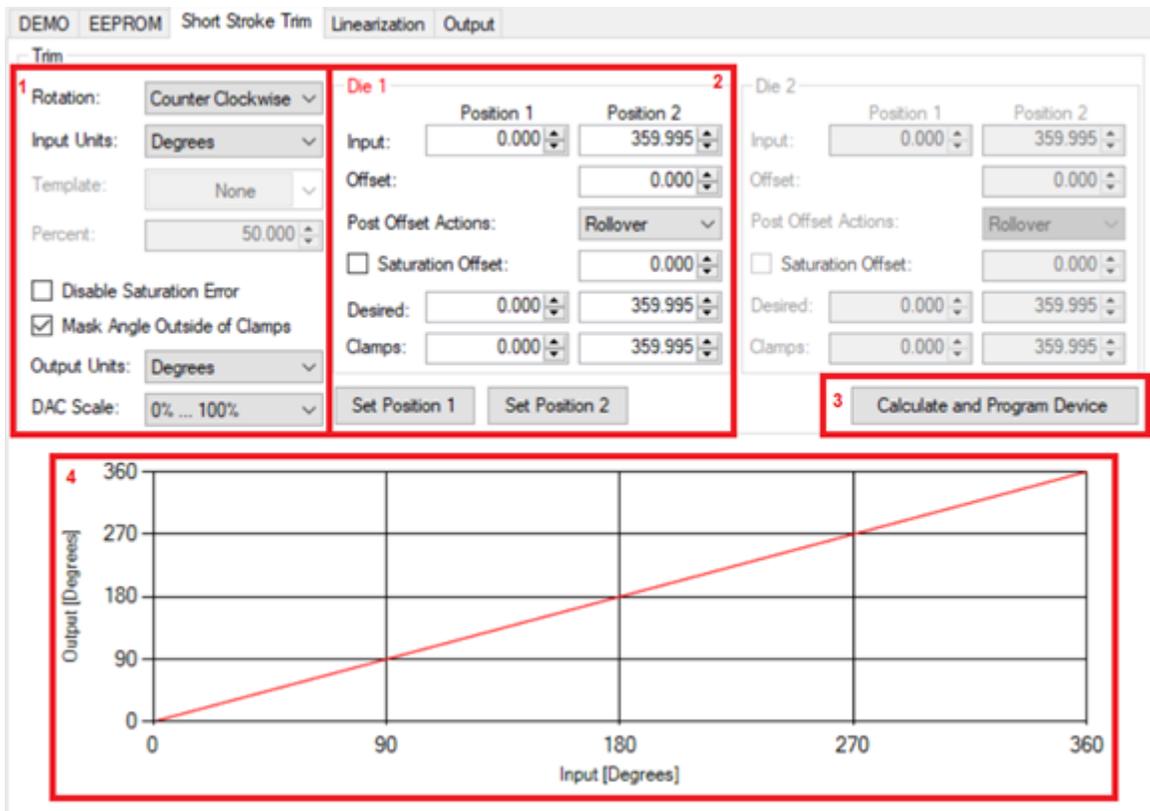   C. Errors: Displays any current error flags active in the device.

2. EEPROM: Provides access to all internal device EEPROM fields for reading and modification.

   A. Show: Selects from a few preset filters to narrow down the available EEPROM fields.

   B. Search Box: Allows for searching specific registers by name.

   C. Action Boxes: Selects what to do with the active registers. Active registers have checkboxes in the "Select" column.

      i. Read Selected: Populates the table with the current register value loaded in the device.

      ii. Write Selected: Programs the device with eh values currently displayed in the table.

      iii. Zero Selected: Populates the table with all 0 code values. Does NOT write to the device. To write values, select "Write Selected" after this button.

      iv. Clear Selected: Clears the table of all populated values. Does NOT write to the device.

      v. Select All: Selects and activates all displayed registers by checking the boxes in the "Select" column.

      vi. Deselect All: Deselects and inactivates all displayed registers by clearing the boxes in the "Select" column.

   D. File Boxes:

      i. Load…: Opens a new dialog box to select and load an excel file and populates the table with the values from the file.

      ii. Save…: Opens a new dialog box to select a location and file name to save the current EEPROM table into an Excel file for export.
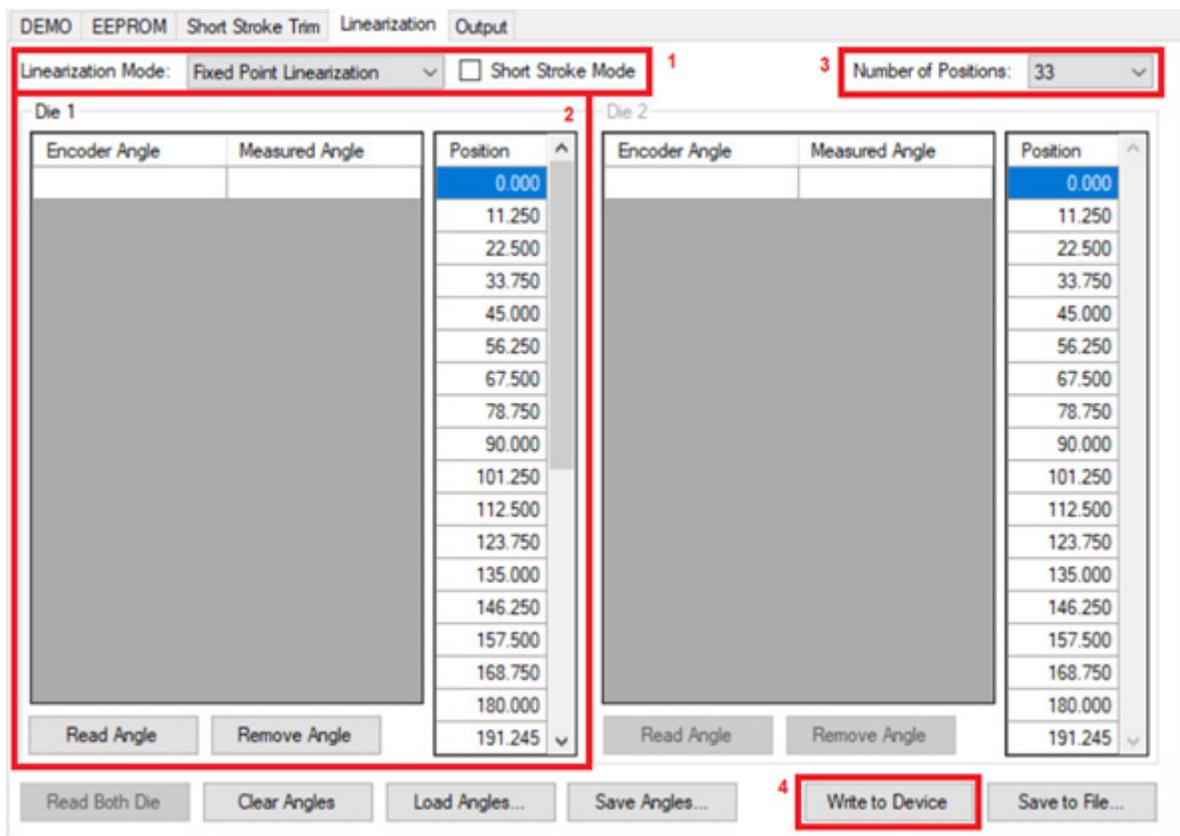
3. Short Stroke Trim: Provides an easy-to-use interface for performing two-point programming of the device. (Angle Offset and Gain corrections).

   A. Application Setup: This section contains settings to be set based on the target application of the A31315 device. This includes setting the preferred input and output units, as well as the target rotation of the magnetic input to the device. A check box for the AOC (Angle Outside of Clamps) mask is also included, as that is a common mask for short stroke applications. For more information about the AOC mask, see the datasheet.

   B. Short Stroke Settings: This section contains information for programming the output profile. Input cells are filled in when clicking the "Set Position 1" and "Set Position 2" buttons and are displayed in the units set by Section 1. The desired outputs for the set positions and internal clamp values must also be set to perform short stroke programming. All other settings in this section are optional and application specific. They are described in more detail in the related datasheet sections.

   C. Once the GUI is setup and input/output values are loaded, the "Calculate and Program Device" button can be pressed. The relevant EEPROM settings update to configure the device as specified.

   D. Output Waveform: This graph shows a theoretical output of the device over an ideal input to confirm all settings align with the desired waveform.

4. Linearization: Provides visual interface and easy-to-use table to allow for error correction using the device's internal linearization feature.

   A. Linearization Mode: This drop-down menu selects in which mode the linearization feature operates. Each mode has a slightly different UI but operates mostly in the same manner.

   B. Linearization Configuration Table: This section includes desired and measured angle values along with positions required for the linearization feature to operate. In Fixed mode linearization, the position values are fully set by section 3 (Number of Points). In variable point linearization, the position of the linearization corrections are a modifiable field. The "Read Angle" button at the bottom populates the Measured Angle values manually to allow for quick reading of the device's current output at each position. The "Desired Angle" column must be manually entered with the ideal output of the device for the measured point.

   C. Number of Positions: This dropdown menu selects the number of linearization points the device uses to correct the signal path.

   D. Write to Device: Once the linearization table is filled in and ready to be programmed, the "Write to Device" button sets the relevant EEPROM registers in the device.

5. Output: Provides an interface for reading details of the selected output protocol. The interface is slightly different based on protocol, but functionally the two are very similar. The drop boxes can be adjusted to change how the device is configured. In order to read and set the drop boxes to how the device is currently configured, press the "Read From Device" button, which updates the settings in this mode to align with the current device setup. If any drop boxes are changed and those settings are to be programmed into the device, the "Write to Device(s)" button writes the settings to the device.

BILL OF MATERIALS

Table 3: A31315 Evaluation Kit Bill of Materials

ELECTRICAL COMPONENTS			
Quantity	Description	Manufacturer	Manufacturer Part Number
1	ASEK31315, Demo, GDB, SOIC8, SMT	Allegro MicroSystems	TED-0002931
1	ASEK31315, Demo, GDB, SOIC8, Socket	Allegro MicroSystems	TED-0002932
1	ASEK31315D, Demo, GDB, TSSOP14, SMT	Allegro MicroSystems	TED-0002934
1	ASEK31315D, Demo, GDB, TSSOP14, Socket	Allegro MicroSystems	TED-0002935
1	ASEK3131x, ASEK-20 Daughterboard	Allegro MicroSystems	TED-0002820

RELATED LINKS

Additional information on the A31315 can be found on the Allegro website:

https://www.allegromicro.com/en/products/sense/linear-and-angular-position/3d-magnetic/a31315

Revision History

Number	Date	Description
–	February 9, 2024	Initial release