

A31316 Evaluation Kit User Guide

DESCRIPTION

The A31316 Evaluation Kit includes everything required to program and evaluate A31316 devices. When used with the Allegro sample programmer, it provides easy evaluation and programming of the A31316 devices without the need for any additional hardware or software.

FEATURES

- ASEK daughterboard with test points for connecting to custom hardware for testing in application
- Sockets for single-die A31316 devices for out-of-the-box evaluation and testing

EVALUATION KIT CONTENTS

- ASEK3131x Daughterboard (TED-0002820)
- A31316 UC Socket (TED-0003187)

Additional Hardware

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

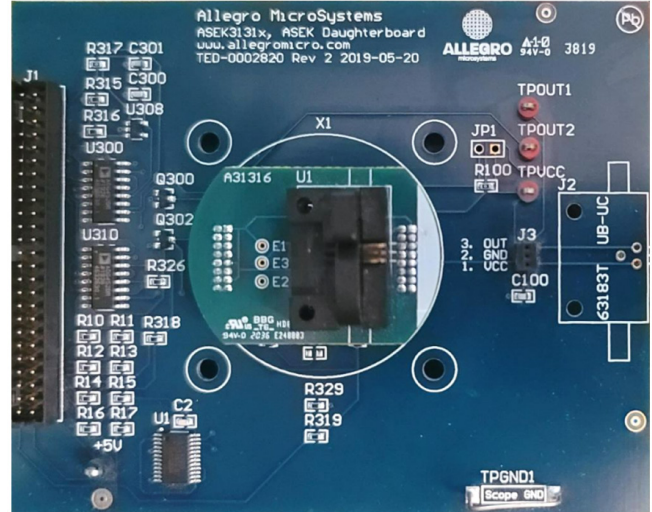


Figure 1: A31316 Evaluation Kit

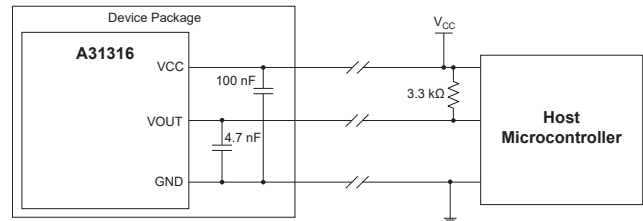


Figure 2: A31316 Typical Application Circuit

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Table 1: A31316 Evaluation Kit/Board Configurations

Configuration Name	Part Number	Comments
ASEK31316, Programming Subkit	TED-0003188	Evaluation Kit
ASEK31316, Programming Kit	TED-0003189	Subkit + ASEK Programmer

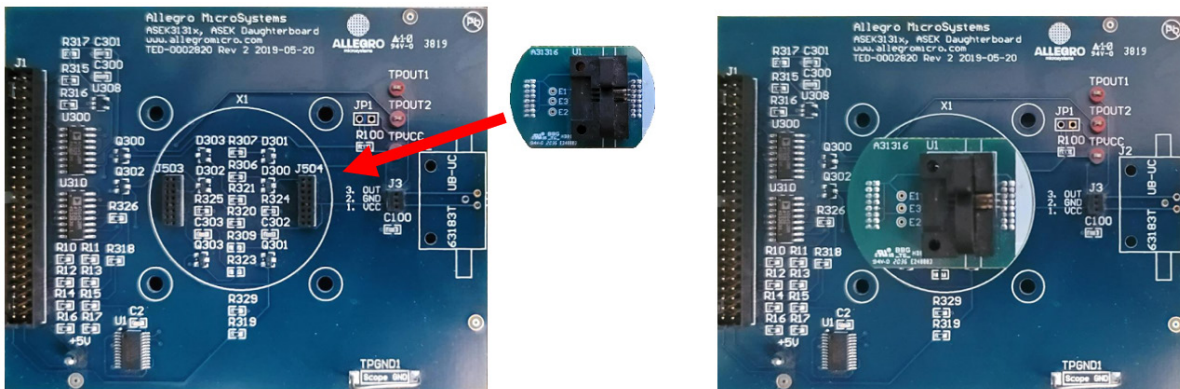
USING THE EVALUATION BOARD

Note: This user guide covers the use of the Allegro programming kit and GUI (Graphical User Interface) for the A31316. When designing custom hardware and software, refer to the datasheet of the device for details about the communication protocol and electrical requirements.

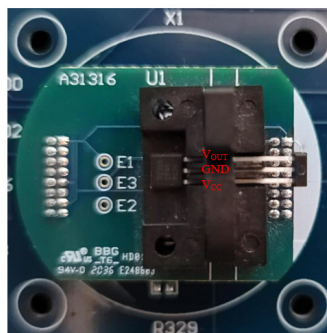
Hardware Setup

The hardware included in the programming subkit is sufficient for adding A31316 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 A31316 specific hardware, as well as an ASEK-20 programmer and all required cables.

1. Setting up the ASEK-20:
 - A. Using the included 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 (covered in the next section) using the USB port.
 - C. Using the included ribbon cable, connect the A31316 daughterboard to the ASEK-20 via the Device Connection port.
 - D. Switch the “Off-On” switch to the “On” position (right). The Power LED should light up green to indicate the power connection is good.
2. Setting up the A31316 device:
 - A. Plug the A31316 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. As an easy reference, the wording and lettering on both boards should both be readable from the same orientation.



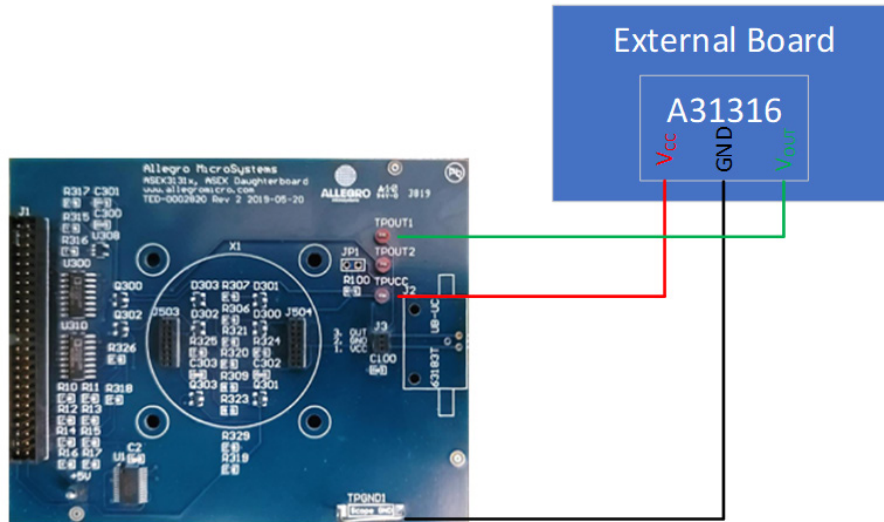
- B. Insert an A31316 device into the socket. The A31316 device should be placed such that the tiebar and leads face out to the right of the socket board, and the plastic package is on the left, with the branded side face up. This places the pinout of the package from top to bottom as noted in the figure below.



*The power supply unit includes multiple plug options to support multiple regions; select and install the relevant plug before connecting to the wall outlet.

3. Alternate setup for A31316:

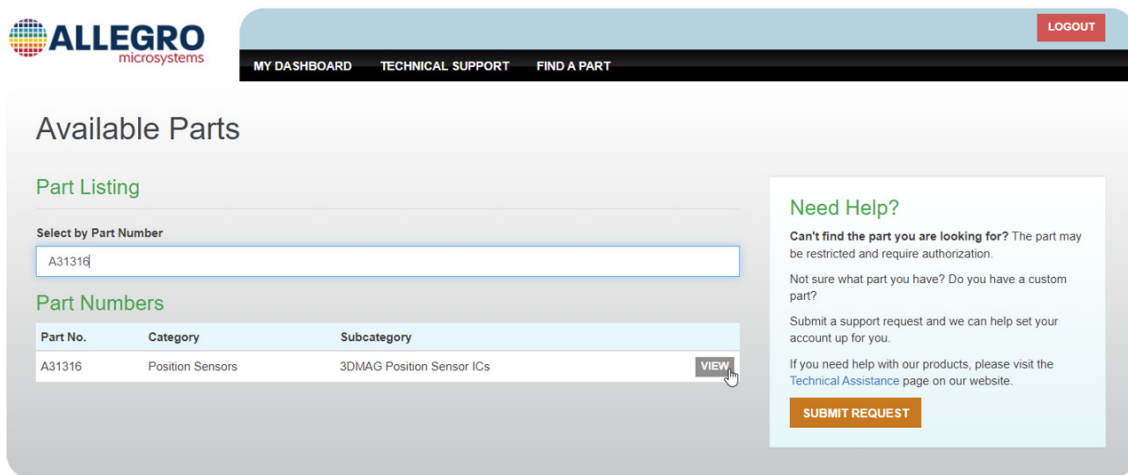
- A. In cases where the A31316 to be tested is in an existing setup such as a custom test fixture, or in an application PCB/harness, it is possible to bypass use of the socket board and connect the A31316 device directly to the daughterboard.
- B. Using the labelled test pins and clip leads (not included), the daughter board provides connection points for the three pins of the A31316.



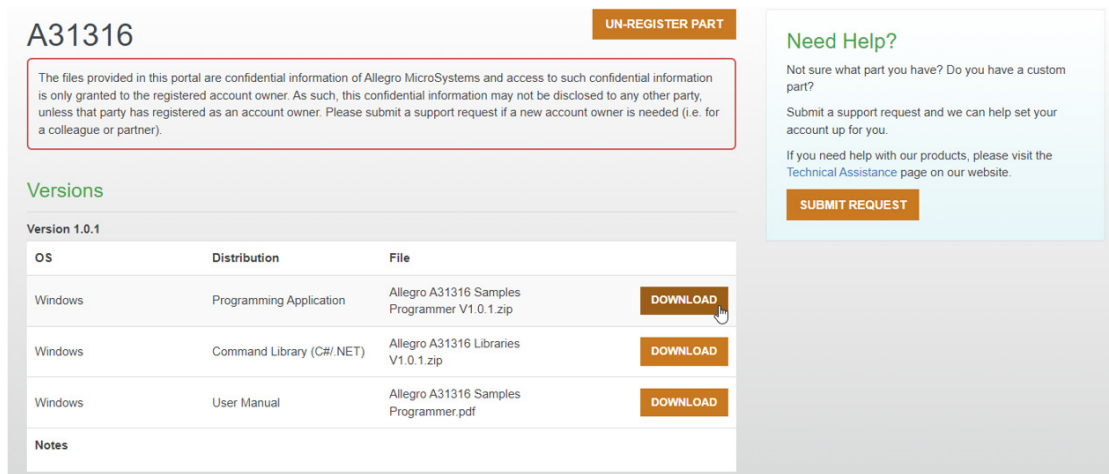
Software Setup

The Allegro GUI provided to evaluate magnetic position sensors contain a variety of features to assist in evaluating devices. For this reason, not all features are covered by this document. The focus of the following procedure is to help familiarize the user with setting up the GUI to communicate with the A31316 device. For additional information on available GUI features, refer to the User Manual on the Allegro Software Portal.

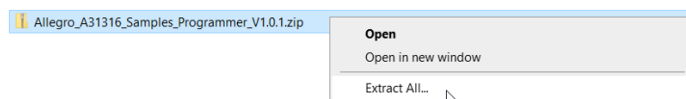
1. Download the A31316 GUI from the Allegro Software Portal:
 - A. Sign in to the Allegro Software Portal: <https://registration.allegromicro.com/login#/>
 - B. Click “Find A Part” to open the Available Parts page.
 - C. Enter “A31316” into the search box.
 - D. Click “View” on the A31316 Position Sensors row:



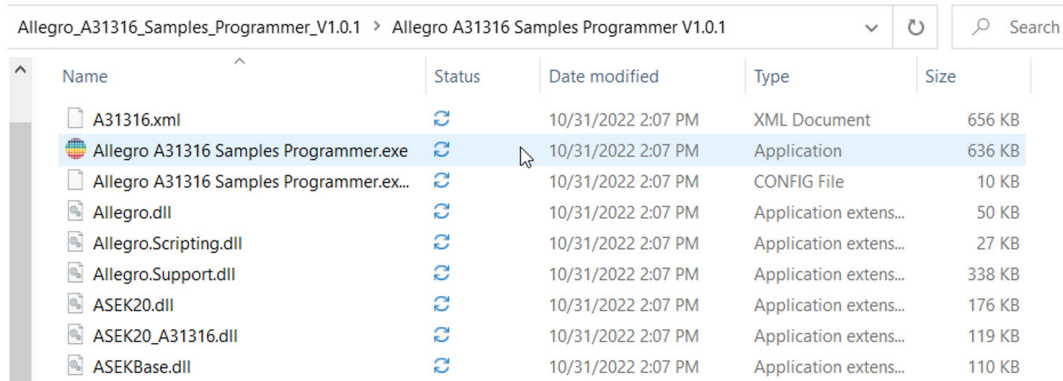
- E. On the A31316 product page, click the “Download” box for the Programming Application:



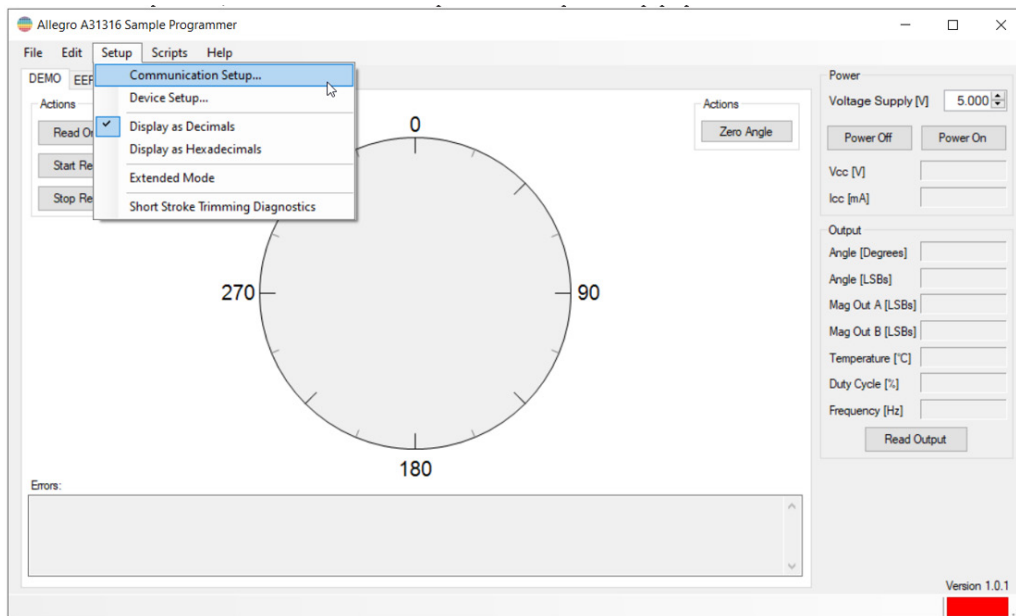
2. Extract the newly downloaded ZIP file:



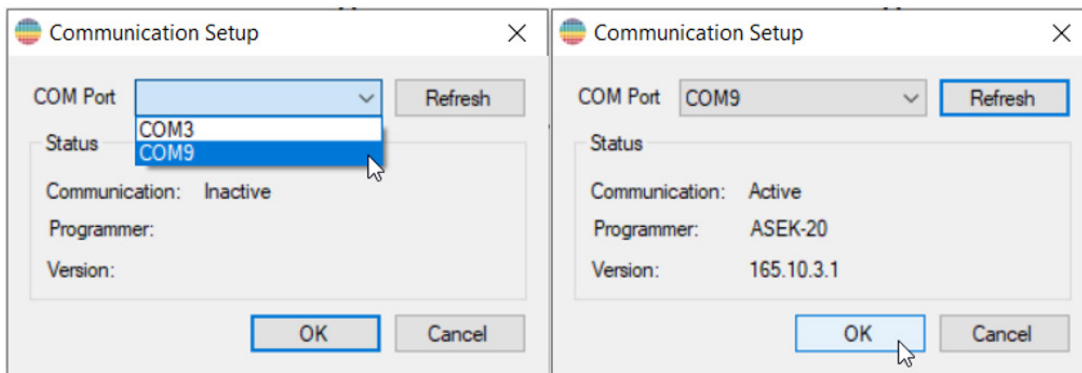
3. In the resulting Allegro A31316 Samples Programmer folder, double-click to open the Programmer GUI:



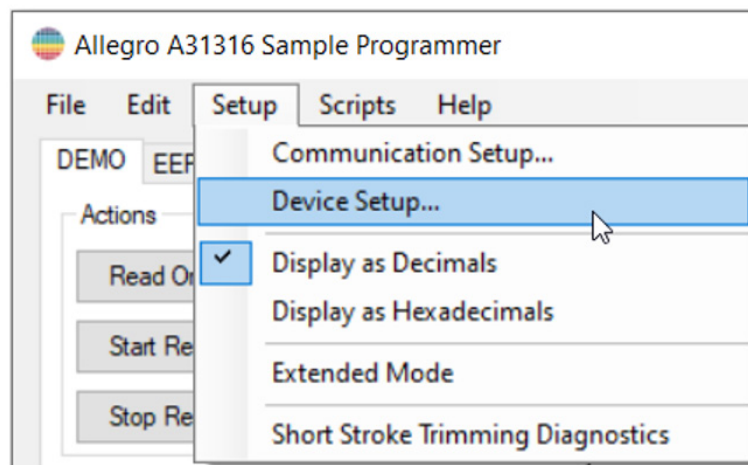
4. Under the Setup toolbar, click “Communication Setup”. This will open a new pop-up.



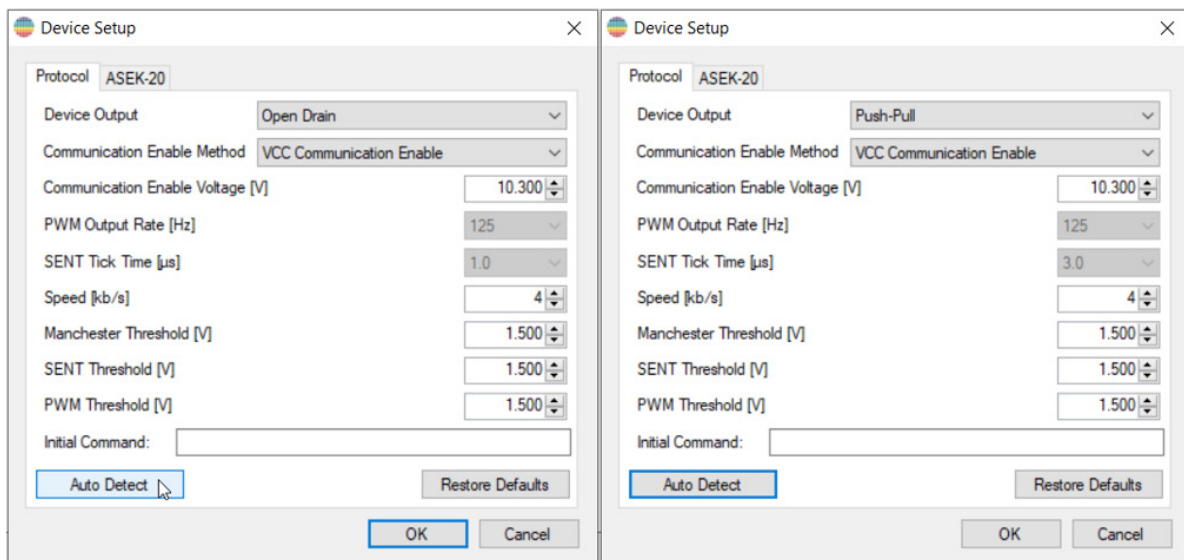
5. Select the COM port associated with the ASEK-20 device. Once the correct COM port is selected, the “Status” info box will populate with information about the ASEK firmware. If an incorrect COM port is selected, the GUI will attempt to communicate with the port until it ultimately times out.



6. Set up the device communication: Again, under the Setup toolbar, click “Device Setup”. This will open a new pop-up window.

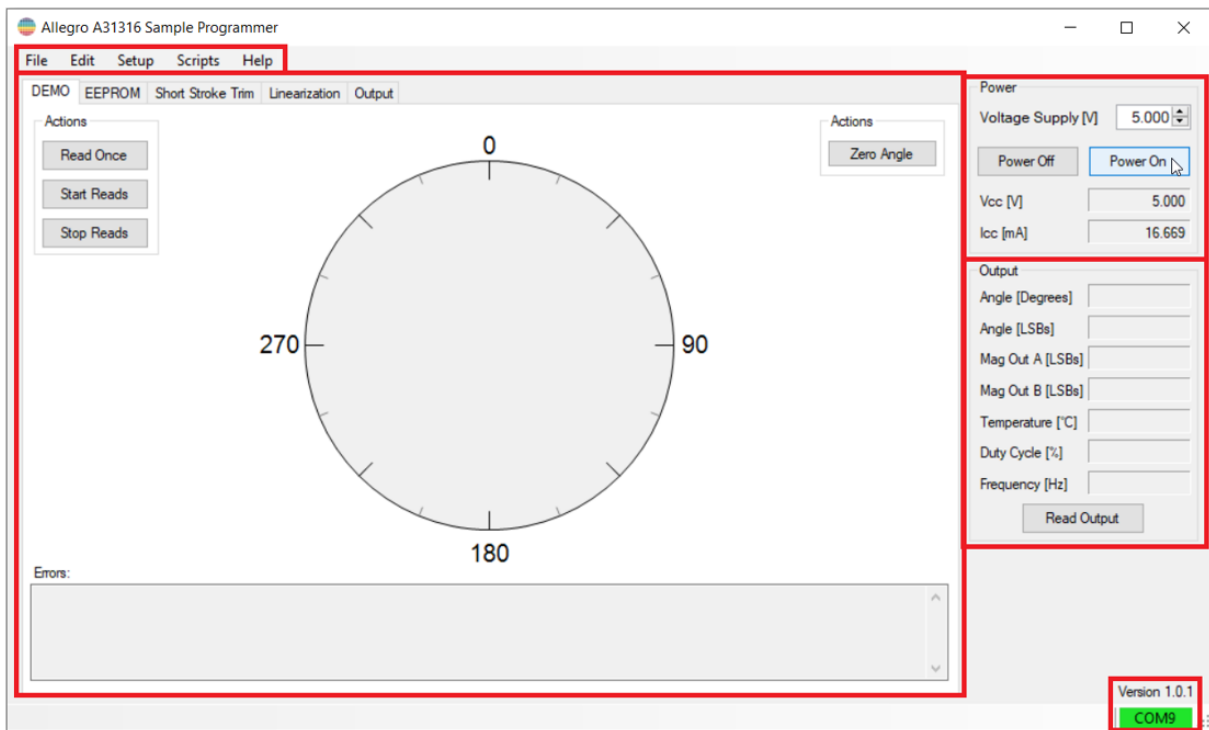


7. If known, the device setups can be manually entered; alternatively, the “Auto Detect” button can be used to attempt multiple communication methods and automatically enter the setup details required for communication.



8. Once “Device Setup” is finished, the device can be powered on and communicated with.

9. The GUI contains four sections:



A. Toolbar: Contains advanced settings for the GUI.

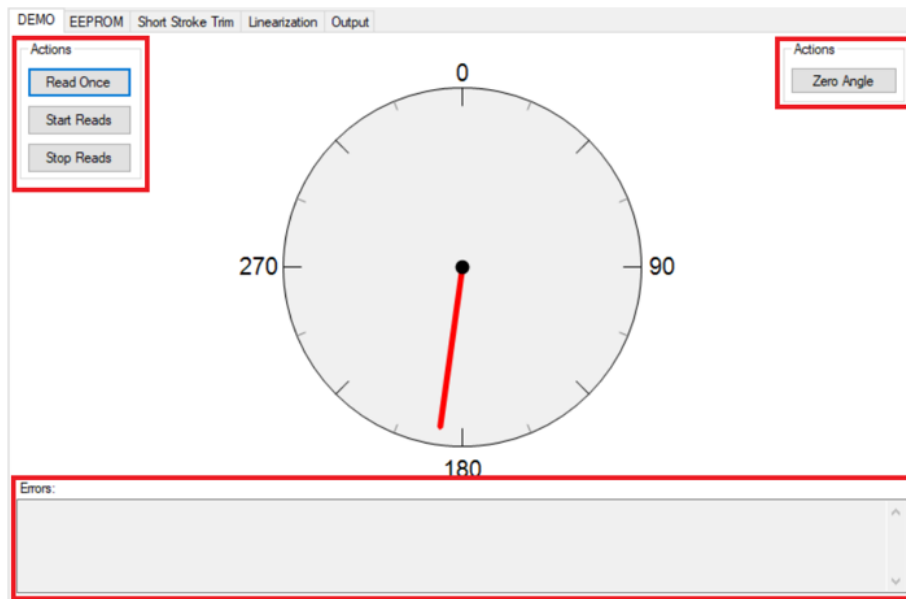
B. Tabs: Changes the main section of the GUI based on desired functionality. Each tab will be covered by its own section.

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

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

Tab Sections:

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



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

DEMO EEPROM Short Stroke Trim Linearization Output

Show: All Fields Search Name and Description

Select	Name	Code	Value	Units
☐	x_die_loc			
☐	y_die_loc			
☐	factory_wafer			
☐	factory_lot			
☐	chan_a_hyst			
☐	chan_b_hyst			
☒	dig_out_drive_sel		1	open-drain
☐	chan_a_dis			
☐	chan_b_dis			
☐	chan_orthog			
☐	spare_0x15			
☐	ang_thresh_en			
☐	ang_thresh_low			
☐	ang_thresh_high			
☐	chan_a_offs			

Read Selected Write Selected Zero Selected Clear Selected Select All Deselect All

Load... Save...

- Short Stroke Trim: Provides an easy-to-use interface for performing two-point programming of the device (Angle Offset and Gain corrections).

DEMO EEPROM Short Stroke Trim Linearization Output

Trim

Rotation: Counter Clockwise 1 Input Units: Degrees

Mask Angle Outside of Clamps

Output Units: Degrees

Input: 0.000 359.995 2 Offset: 0.000 Post Offset Actions: Rollover

Saturation Offset: 0.000 Desired: 0.000 359.995 Clamps: 0.000 359.995 3

Set Position 1 Set Position 2 Calculate and Program Device

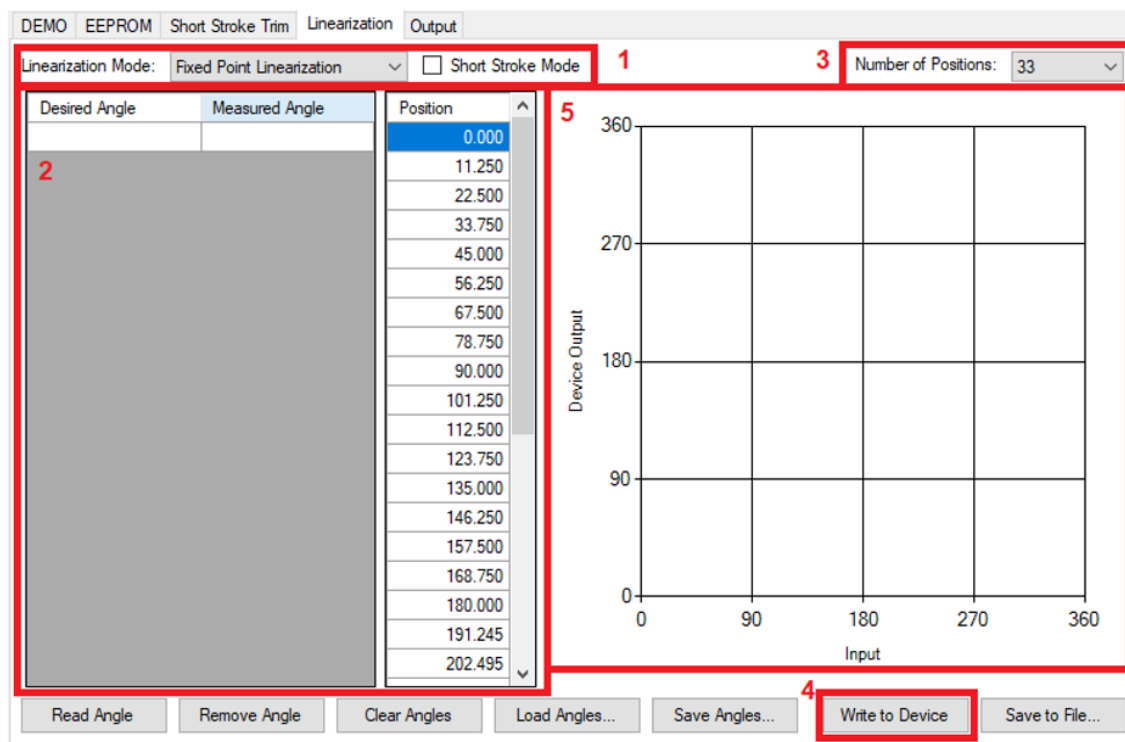
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Output [Degrees]

Input [Degrees]

A. Application Setup: This section contains settings to be set based on the target application of the A31316 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 will be filled in when clicking the “Set Position 1” and “Set Position 2” buttons and will be 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 set up and input/output values are loaded, the “Calculate and Program Device” button can be clicked and will update the relevant EEPROM settings 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 which mode the linearization feature will operate. Each mode will have a slightly different UI but will operate 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”), while in variable point linearization, the position of the linearization corrections will be a modifiable field. The “Read Angle” button at the bottom will populate 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 drop-down menu selects the number of linearization points the device will use 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 will set the relevant EEPROM registers in the device.
- E. Correction Plot: This figure will show an updated correction curve. The output shown will be the output of an ideal input with the corrections calculated by the input table. If the device was previously measured in application, this figure should be an inverted version of the device’s native performance.

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-down menus can be adjusted to change how the device is configured. In order to read and set the drop-down menus to how the device is currently configured, the “Read From Device” button can be clicked, which will update the settings in this mode to align with the current device setup. If any drop-down menus are changed and it is desired to program them into the device, the “Write to Device(s)” will write to the device.

The image displays two side-by-side screenshots of the Allegro MicroSystems software interface, specifically the 'Output' tab. Both windows have a menu bar with 'DEMO', 'EEPROM', 'Short Stroke Trim', 'Linearization', and 'Output'. The left window is titled 'Analog Output' and features several configuration options: 'Output on ANALOG Pin:' (a dropdown menu), 'Load Capacitance [nF]:' (a dropdown menu with '0' selected), 'DAC Scale:' (a dropdown menu with '0%...100%' selected), 'Output Response To Errors:' (a dropdown menu with 'High-Z' selected), 'Angle Updates to Trigger Error:' (a dropdown menu with '0' selected), 'Angle Updates to Clear Error:' (a dropdown menu with '0' selected), 'Initial Output Value:' (a dropdown menu with 'Low' selected), and 'Additional Power Up Delay:' (a dropdown menu with '0.5 ms' selected). Below these settings is a 'Read Output' button and a large text area for output data. At the bottom are buttons for 'Load from File...', 'Read From Device', 'Write to Device(s)', and 'Save to File...'. The right window is titled 'PWM Output' and features: 'SENT/PWM Pin:' (a dropdown menu with 'PWM' selected), 'Carrier Frequency [Hz]:' (a dropdown menu with '125' selected), 'Updates to Clear Error:' (a dropdown menu with '0' selected), a checkbox for 'Tristate Output when Error Flags Set' (unchecked), 'Output Drive:' (a dropdown menu with 'Open Drain' selected), a checkbox for 'Enable Fall Time Control' (unchecked), 'Fall Time:' (a dropdown menu with '0 - Quickest' selected), a checkbox for 'Enable Rise Time Control' (unchecked), and 'Rise Time:' (a dropdown menu with '0 - Fastest' selected). It also includes a 'Read Output' button, a large text area for output data, and the same bottom buttons as the left window.

BILL OF MATERIALS

Table 2: A31316 Evaluation Kit Bill of Materials

ELECTRICAL COMPONENTS						
Designator	Quantity	Comment	Description	Manufacturer	Manufacturer Part Number	PCB Label
1	1		ASEK31316, GDB, UC, Socket	Allegro	TED-0003187	
2	1		ASEK3131x, ASEK-20 Daughterboard	Allegro	TED-0002820	

RELATED LINKS

Product Webpage: <https://www.allegromicro.com/en/products/sense/linear-and-angular-position/3d-magnetic/a31316>

Revision History

Number	Date	Description
–	June 26, 2023	Initial release

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