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A31315 Samples Programmer User Manual

A Guide to using the Allegro A31315 Samples Programmer

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Welcome

Welcome to the Allegro A31315 Samples Programmer.

The A31315 is a Hall-effect-based magnetic angle and linear position sensor IC for consumer, industrial, and automotive applications.

The A31315 uses planar and vertical Hall plates to measure magnetic fields in two out of three factory-selected dimensions. The user can output the angle between these two axes or output the field of one of the axes in analog or PWM output.

In SENT output, the user can output the angle between the two channels or the field of both channels.

The user can program compensation to correct for any nonlinearity in the system for slide-by-linear sensing and off-axis angle sensing applications.

The A31315 contains advanced Hall plate chopping, removing nearly all the offset in the system, as well as polynomic temperature correction, and when combined with available segmented linearization, provides highest accuracy sensing.

The A31315 also comes with all the features needed for high reliability automotive applications, including undervoltage (UVD), overvoltage (OVD), built-in self-test (BIST) diagnostics, and broken wire detection.

The A31315 is being developed in accordance with ISO 26262:2011 (2018) as a hardware safety element out of context targeting ASIL (B/D) capability for use in automotive safety-related systems when integrated and used in the manner prescribed in the applicable safety manual and datasheet.

Version

2021-01-18 Version 1.2

Support

Support on our website: https://registration.allegromicro.com/

We would like to make this the best A31315 programmer possible. Your input is valuable to us. Please, do not hesitate to contact us with problems or suggestions.

Hardware Requirements

To run this application you need one of the following:

An ASEK-31315-T-KIT which contains:

- ASEK-20-T-KIT
    - ASEK-20 Chassis with main Motherboard inside (85-0540-004)

    - USB Communications Cable
    - DC Power Supply/Cable with AC Outlet Adapters
    - Proto Board (Part # 85-0540-103) (Not required with A31315 communication)
    - Ribbon Cable (Part # 85-0540-300)
- ASEK-31315-SUBKIT-T
    - A31315 Grand Daughterboard SMT, Single Die (Part #: TED-0002931)
    - A31315 Grand Daughterboard Socket, Single Die (Part #: TED-0002932)
    - A31315 Grand Daughterboard SMT, Dual Die (Part #: TED-0002934)
    - A31315 Grand Daughterboard Socket, Dual Die (Part #: TED-0002935)
    - A3131x Daughterboard (Part #: TED-0002820)

Or

An ASEK21-T-KIT which contains:

- ASEK-21 Main Board (Part #: 85-0712)
- ASEK-21 Calibration Board (Part #: 85-0712-100)
- ASEK-21 Daughter Board (Part #: 85-0712-103)
- ASEK-21 Cable (Part #: 85-0712-301)
- USB A male to B male 3-foot cable (Part#: 3021001-03)
- ASEK-21 Power Supply (Part #: EMMA050400-P5P-IC)

ASEK Setup

Setting up ASEK-20 or ASEK-21

Connecting the ASEK-20 to the PC

1. Connect one end of the USB communications cable to a personal computer
2. Connect the other end of the USB communications cable to the “USB” port on the ASEK-20 chassis.
3. Connect the ribbon cable to the J2 connector on the daughterboard (TED-0002820)
4. Connect the other end of the ribbon cable to the “Device Connection” port on the ASEK-20 chassis
5. Connect the DC Power Supply/Cable to the 5V port on the ASEK-20 chassis
6. Plug in the DC Power Supply to a 110V/220AC 60/50Hz outlet with the proper adapter

Figure 1: ASEK-20 Setup

Connecting the ASEK-21 to the PC

1. Connect one end of the USB communications cable to a personal computer
2. Connect the other end of the USB communications cable to the “USB” port on the ASEK-21 chassis.
3. Connect the cable from the module to the “Device Connection” port on the ASEK-21 chassis
4. Connect the DC Power Supply/Cable to the 5V port on the ASEK-21 chassis
5. Plug in the DC Power Supply to a 110V/220AC 60/50Hz outlet with the proper adapter

Figure 2: ASEK-21 Setup

Setting Up Hardware Communication

Installing the Software

Place the zip file where you want the software to be run. Unpack the zip file. A folder called **Allegro A31315 Samples Programmer** should have been created. All the files need to run should be in the folder. The application is the file called **Allegro A31315 Samples Programmer.exe** in this folder.

Starting the Application

1. Double click on the application icon. The main window will appear (see Figure 3).

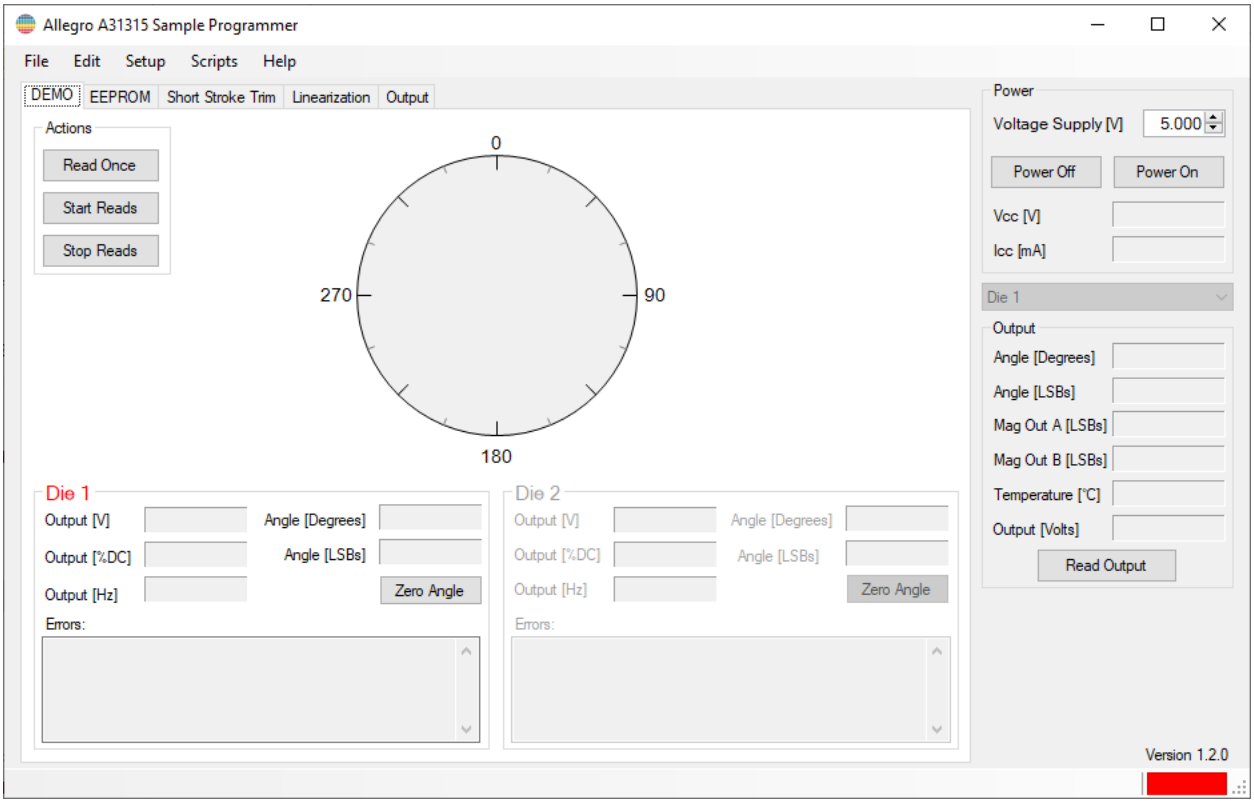


Figure 3: Main Window

2. The application is running but is not connected with the ASEK-20. To connect to the ASEK-20, click on Setup in the menu bar.

3. On the Setup pull down menu, select **Communications Setup...**. The Communications Setup dialog box will appear (see Figure 4)

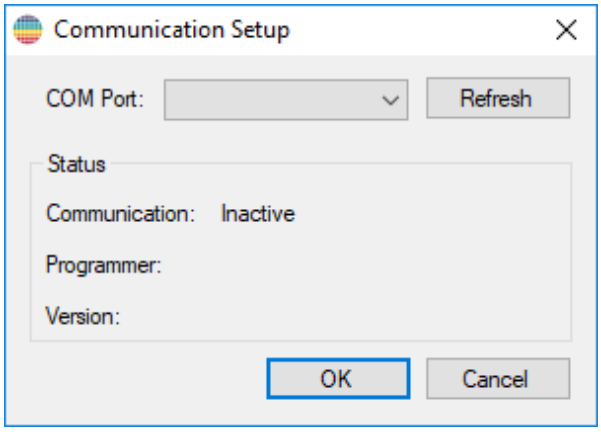


Figure 4: Communication Setup Dialog Box

4. Click the COM port pull down and select the COM port that is the ASEK-20. If you do not know which COM port the ASEK-20 is connected to, then do the following:

   i. Unplug the USB cable to the ASEK-20.

   ii. Click **Refresh** at the top right of the communication setup dialog box.

   iii. Click on the **COM Port** pull down menu and note which ports are in the menu.

   iv. Plug the USB cable back into the ASEK-20.

   v. Click **Refresh** again.

   vi. Click the **COM Port** popup menu again.

   vii. The new COM port in the menu is the ASEK-20. Click the COM port for the ASEK-20.

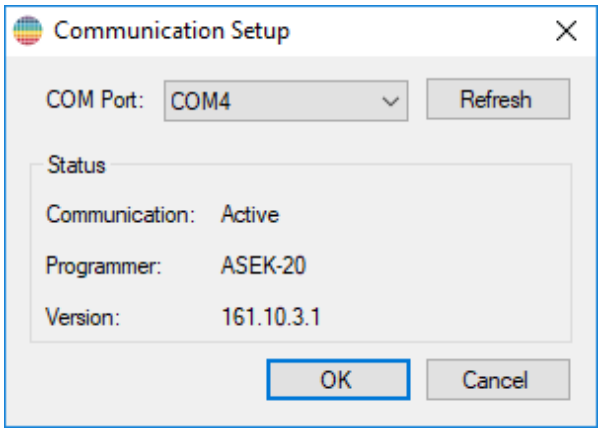


Figure 5: ASEK-20 Connected

5. If the ASEK-20 is turned on, the Status field on the Communication Setup dialog box will change from Inactive to Active, and the firmware version will be displayed (see Figure 5). If the ASEK-20 is not on, do the following:

    a. Turn the ASEK-20 on.

    b. Click **Refresh** at the top right of the Communications Setup dialog box. The Communication line in the Status field should change to Active.

6. Click **OK**. The com port will be saved and used the next time the application is started.

Status Bar

The Green or Red colored rectangle on the right side of the status bar indicates the status of the communication with the ASEK. If Red, the communication is not active and if green the application is communicating with the ASEK. The COM port that is currently set is overlaid on the colored rectangle. Clicking on the rectangle will open the Communication Setup dialog.

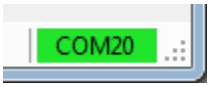


Figure 6: Status Bar with ASEK-20

Troubleshooting

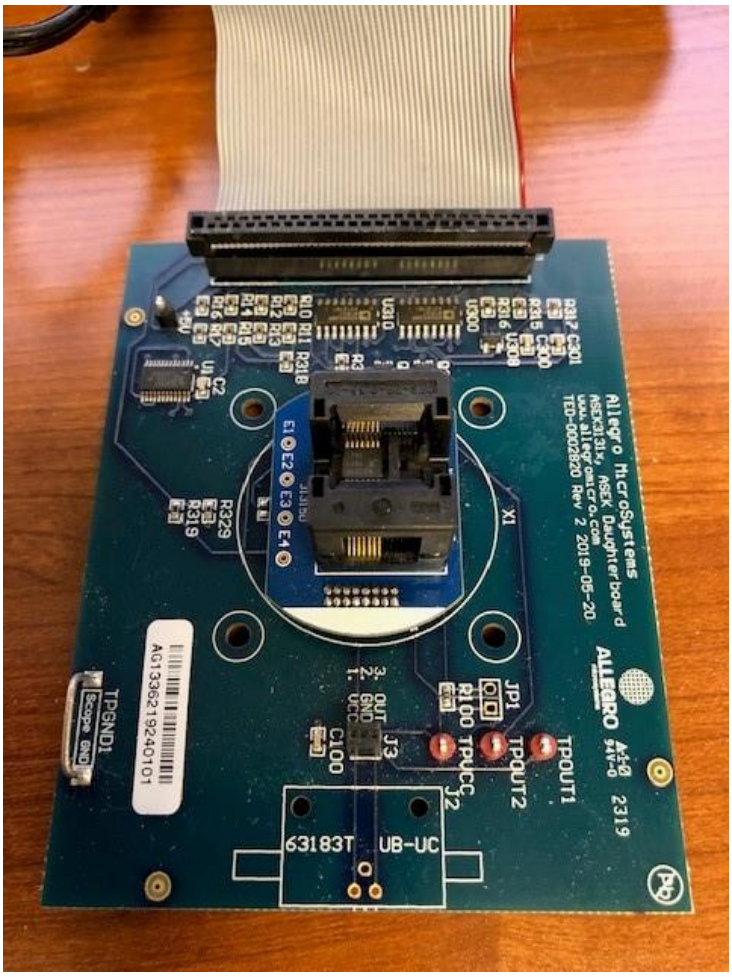
If the driver to communicate to the ASEK-20 or ASEK-21 was not loaded automatically, a copy of the driver is available at http://www.ftdichip.com/Drivers/VCP.htm

Device Setup

Connecting the Device to the ASEK-20 or ASEK-21

Connecting the Device to the ASK-20 with the Daughterboard

1. Insert a device into the socket on the TED-0002932 (Single Die) or TED-0002935 (Dual Die).
2. Mount the socketed grand-daughterboard onto the daughter board (TED-0002820)



Connecting the Device to the ASEK-21

When connecting the A31315 to the ASEK-21 the following guidelines must be used.

1. The VCC_F and VCC_S lines need to be connected. If using the stable or accurate feedback power option, then the lines can be shorted together as close to the connecter as desired, otherwise when using the external feedback option, the VCC_S line needs to come from the module and connect to the VCC_F line there.
2. The VOUT_F and VOUT_S lines need to be connected either at the connecter or the module.
3. The GND_F and GND_S lines need to be connected either at the connecter or the module.

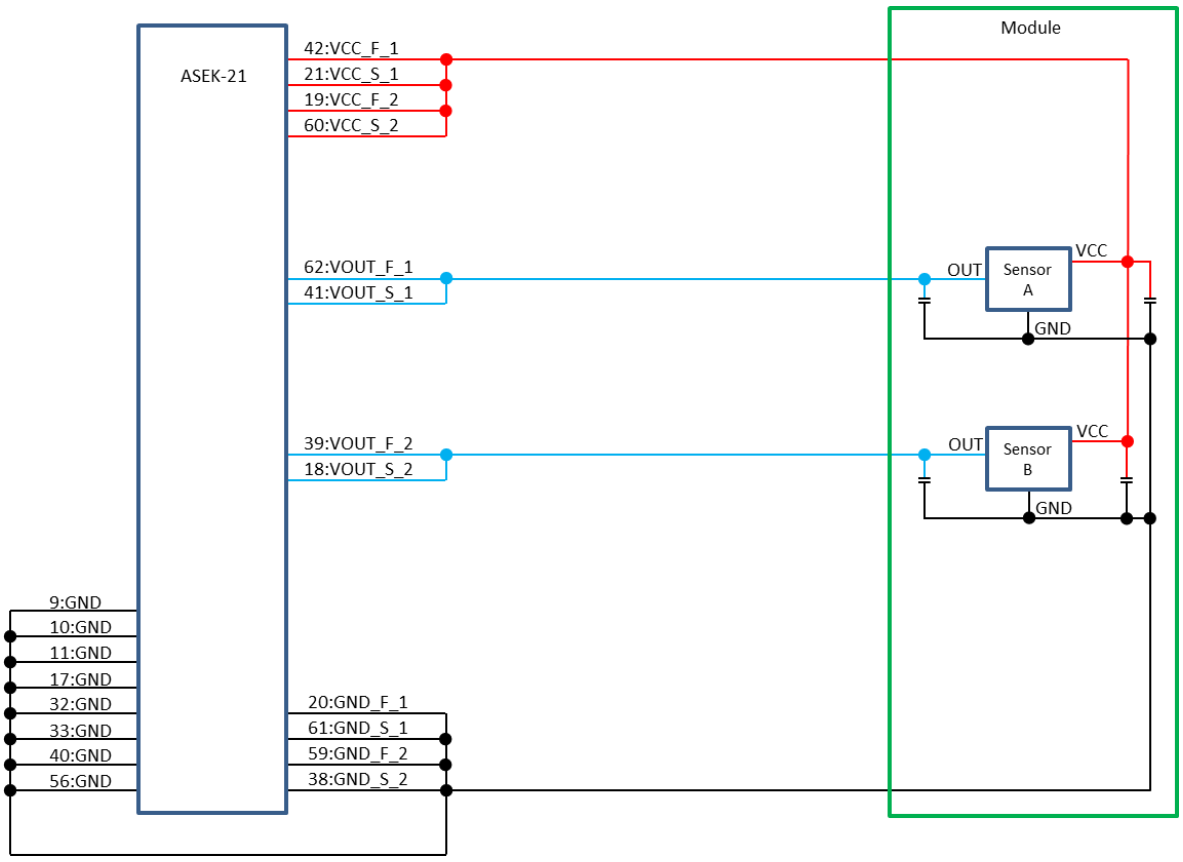


Figure 7: Connecting 2 Devices to ASEK-21

Setting Up Communications

To set which communication protocol is to be used, click **Device Setup…** from the Setup pull-down menu.

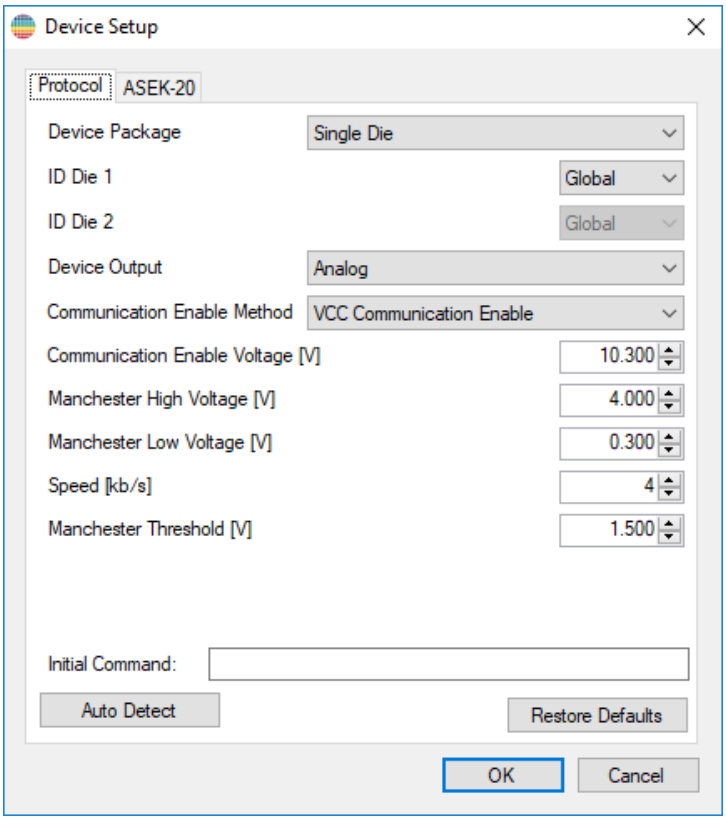


Figure 8: Device Setup, Analog Manchester Parameters

1. Select between Single Die or Dual Die from the **Device Package** pop-up menu.
2. If the ASEK in use is an ASEK-21 and the outputs are ties together then select the die IDs that have been wired into the device, otherwise leave the **Die ID** pop-ups as Global.
3. The **Auto Detect** button in the lower left corner of the Protocol Tab will auto detect which programming the device contains and will setup the communication parameters accordingly and all of the following steps can be skipped. Warning: Vcc will be raised to the **Communication Enable Voltage** so do not use if this will damage any device connected to Vcc.
4. If the device is programmed so the output is Analog
    a. If VCC is to be raised to initiate communications, then select Vcc Communication Enable from the **Communication Enable Method** pop-up.
    b. Otherwise select Overdrive. This will have the ASEK force the output of the device to the Manchester Low Voltage to initiate communications.
    c. If using the ASEK-20 and if the 100nf capacitor is not supplied, make sure the 100nf capacitor is enabled on the ASEK-20 tab.
5. If the device is programmed so the output is digital (PWM or SENT) and the output driver is open drain.
    a. If VCC is to be raised to initiate communications, then select Vcc Communication Enable from the **Communication Enable Method** pop-up.

b. If the device is programmed so the output is PWM, select Auxiliary Interrupt Pulse (PWM) from the from the **Communication Enable Method** pop-up and select the PWM output rate that matches the device.
c. If the device is programmed so the output is SENT, select Auxiliary Interrupt Pulse (SENT) from the from the **Communication Enable Method** pop-up and select the SENT tick time that matches the device.
d. If a pull-up is not supplied, then on the ASEK-20 or ASEK-21 tab select the pull-up resister option.

6. If the device is programmed so the output is digital (PWM or SENT) and the output driver is push-pull.
   a. If VCC is to be raised to initiate communications, then select Vcc Communication Enable from the **Communication Enable Method** pop-up.
   b. If the device is programmed so the output is PWM, select Auxiliary Interrupt Pulse (PWM) from the from the **Communication Enable Method** pop-up and select the PWM output rate that matches the device.
   c. If the device is programmed so the output is SENT, select Auxiliary Interrupt Pulse (SENT) from the from the **Communication Enable Method** pop-up and select the SENT tick time that matches the device.
   d. A pull-up is not needed so on the ASEK-20 or ASEK-21 tab verify the pull-up resister option is not selected.

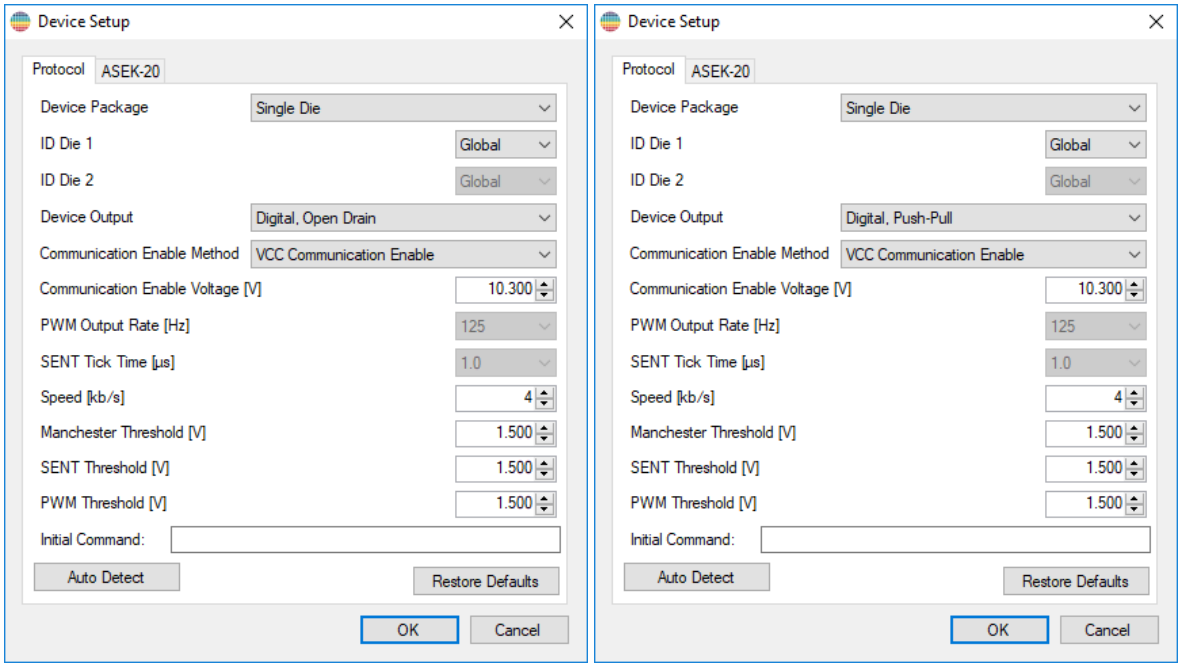


Figure 9: Device Setup, Digital Manchester Parameters

Unless there are problems, the default values can be used for all of the other parameters.

Turning the Device On/Off and Reading the Output

1. Click **Power On.**
2. The Vcc [V] and Icc [mA] fields in the right-hand side of the main window will be updated with the measured values. Verify that the voltage is what is desired, and that the device is consuming approximately 6 mA for single die, 13 mA for dual die. The Icc is an un-calibrated reading and should be used as a qualitative indicator.
3. Click **Power Off** to turn power off to the device. Icc will fall to 0.
4. Click **Power On** then click **Read Output**. All the angle, voltage, duty cycle and frequency fields will be updated.

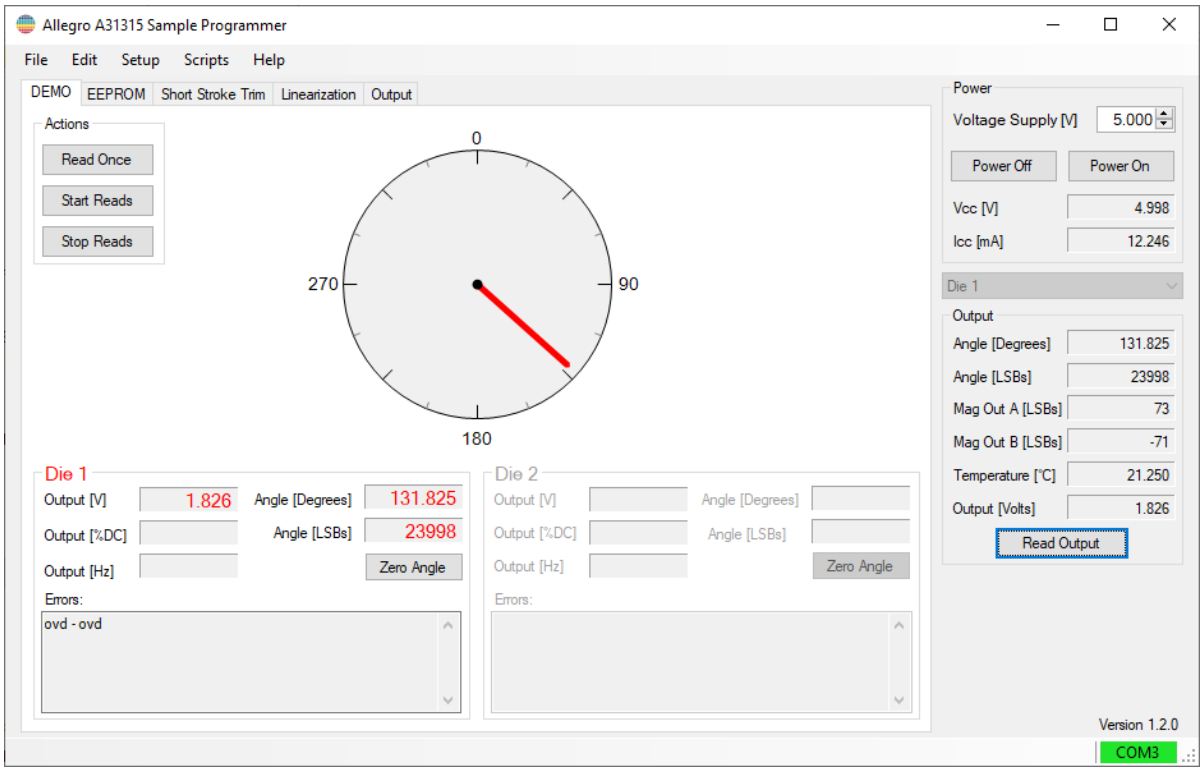


Figure 10: Powered On and Updated

Reading from the device

Reading a Field

1. On the Main Window, click on the **EEPROM** Tab. The **Show**: popup should be showing **All Fields**.
2. Scroll down the table until you see **lin_coeff_00**.
3. Click on the checkbox that is next to **lin_coeff_00**.
4. Click on the **Read Selected**, The EEPROM tab will appear like Figure 11.

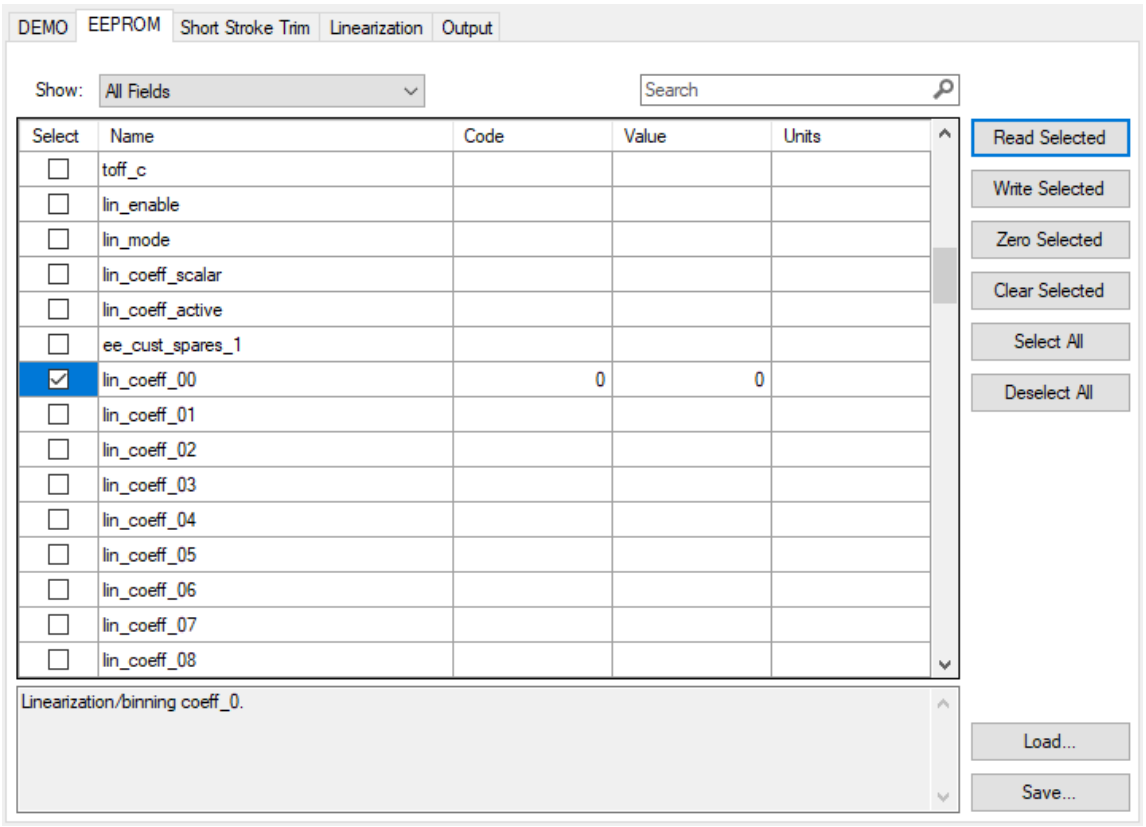


Figure 11: Reading a Field

Reading a Memory Location

1. On the **Show**: pull down menu, select **All Memory Locations**.
2. Click on the checkbox that is next to **0x21**.
3. Click **Read Selected**. The window should appear as it does in Figure 12.

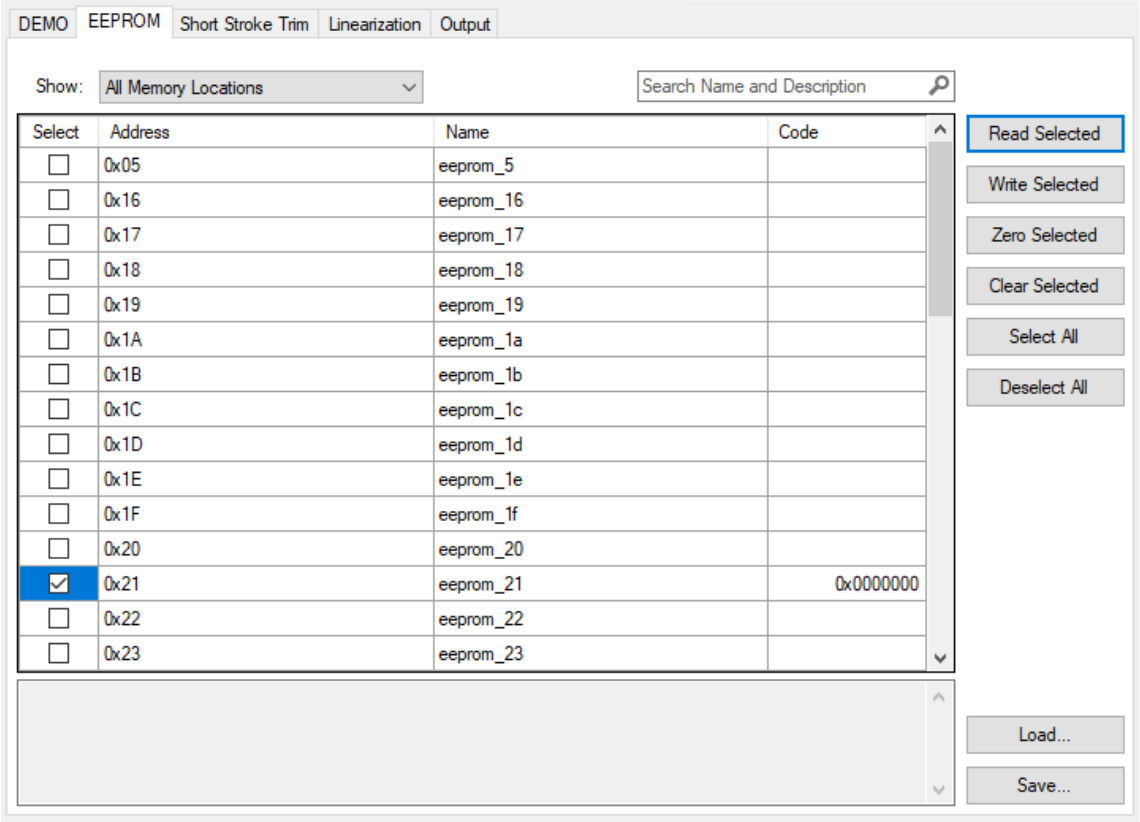


Figure 12: Reading a Memory Location

4. To verify that the reading a field and reading a memory location are reading the same location, look at **lin_coeff_00**. If you look at location 0x21 the value in the field and the value in the memory location are the same (in this case 0x0).

Writing to the device

Writing a Field

1. Select **All Fields** from the **Show:** pull down menu.
2. Scroll down the table to the **lin_coeff_00** row.
3. Double click in the text entry box in the **Code** column of the **word** row.
4. Type **291** and press **Enter**. The Selected checkbox will be checked and the cell in the Value column will be set to 291.
5. Click **Write Selected**. The window should appear as it does in Figure 13.

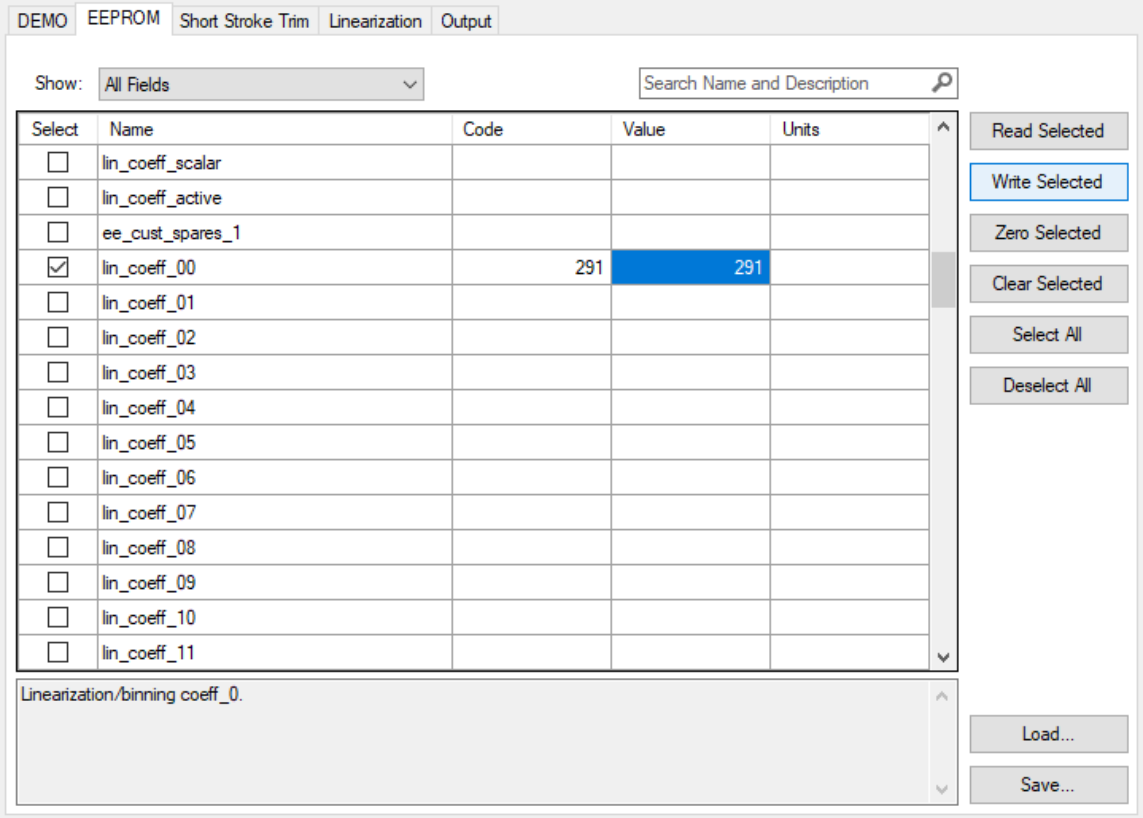


Figure 13: Writing a Field

6. To verify that the **lin_coeff_00** field was written to the device, do the following:
    a. Click **Clear Selected**. The values in the Code and Value cells should disappear.
    b. Click **Read Selected**. The values that were written will reappear in the Code and Value cells.

Writing a Memory Location

Writing to a Memory Location is done the same way.

1. From the **Show:** pull down menu, select **All Memory Locations**.
2. To ensure that there is not any memory locations selected, click **Deselect All**.
3. Scroll down the table and click the checkbox in the **Select** column next to **0x21**.
4. Click **Read Selected**. The value in the Code column should be something like 0x0246000.
5. Change the 0x0246000 to 0x000321 by double-clicking in the field, typing **0x0642000**, and pressing **Enter**.
6. Click **Write Selected**. The memory location is now changed to **0x0642000**.
7. To verify that the memory location has been changed, select **All Fields** from the **Show:** pull down menu and scroll down to the **lin_coeff_00** row. It should now read 801.

Device Selection

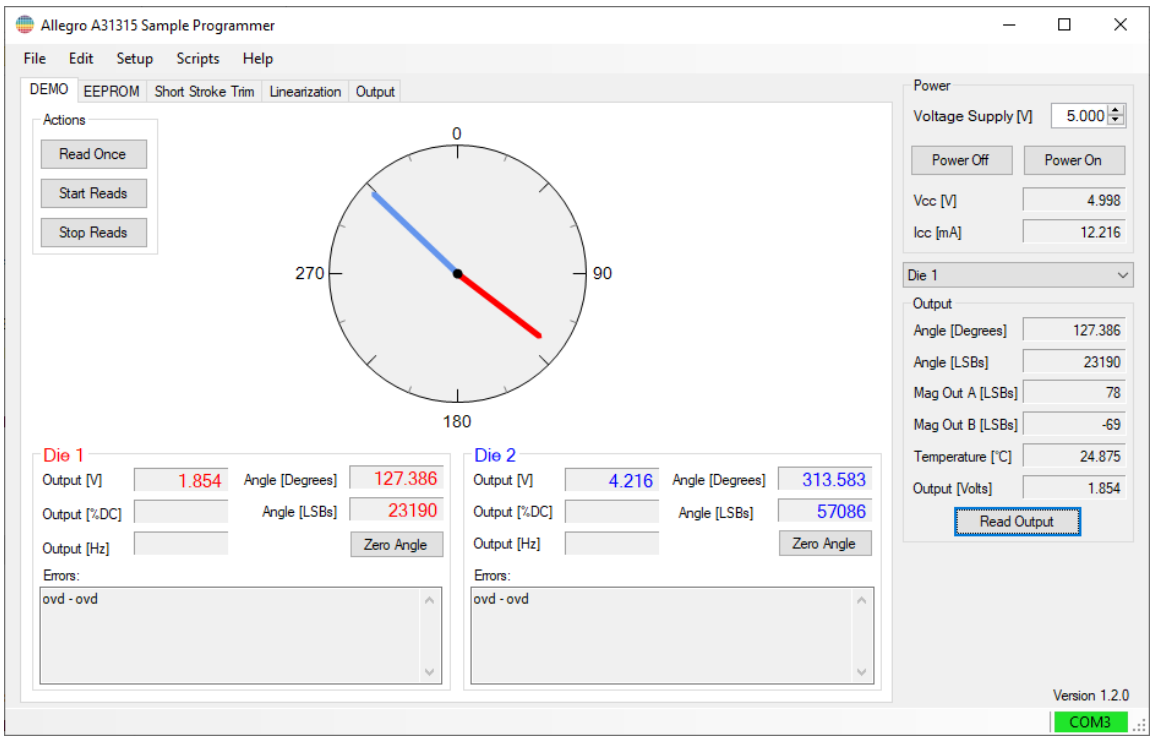


Figure 14: Device Selection

1. Select **Die 1** from the pop-up menu below the Power group to select the first die and **Die 2** to select the second die (ASEK-20 and ASEK-21 when "Enable dies to port mapping" is enabled).

Troubleshooting

Troubleshooting when using Manchester Protocol

1. If using a device setup to output Analog, is the 100nf capacitor settings for OUT enabled or is there a dedicated capacitor on OUT?
2. If using a device setup to output SENT or PWM, is the pull-up resister settings for OUT enabled or is there a dedicated pull-up resister on OUT, or is the output push-pull?
3. Click on the **Power On** while holding down the Ctrl key. This the turns power on for the device without checking for access. Verify that Vcc is within the operating range.
4. Turn off the device.
5. Turn on the device and verify using an oscilloscope that the access code was sent on the OUT line during the power up.
6. Looking at the access code that was sent, were the Manchester serial high level and serial low-level values within the spec for the device?
   6.1. If not, adjust the serial high level and serial low-level values in the Device Setup dialog in the programming application then go back to step 2.
7. Perform a read and verify using an oscilloscope that there was a read response on the OUT line.
   7.1. If there was not a read response, slow down the communication speed and go back to step 2.

7.2. If there still is not a read response, make sure the access code is correct.
7.3. Make sure the address used is correct. For single die/device the address global can be used but for multiple die/devices, make sure the addresses are unique.

8. Once there is a read response, did the ASEK interpret the read response correctly?
   8.1. No. What was the error message?
      8.1.1. If the error was Timeout, using an oscilloscope, check the voltages of the response. Are the lower values below the threshold and the higher values above the threshold? If not, adjust the threshold so that is between the high and low values and go back to step 2.
      8.1.2. If the error was CRC error, retry the read. Try slowing down the communication speed.
9. Perform a write and verify using an oscilloscope that there was a write command.
10. Perform a read command to verify what was written previously.
    10.1. If the value read is not what was written?
       10.1.1. Verify that the part is not locked. If it is then try another part.
       10.1.2. Try another part to make sure the part is good.

Menu Bar

File

Load Memory File…
Restore the parameters set in a previous session. After selecting a file from the standard file browser, this command loads the parameters and selects them. The files do not have to contain all the parameters.

Save Memory File…
Saves the currently selected parameters to a file. After naming the file using the standard file browser, this command saves the selected parameters into the file. The files do not have to contain all the parameters.

Dump Memory…
Saves the entire memory map to a file. After naming the file using the standard file browser, this command saves the memory map into the file.

Exit
Exit the application.

Edit

Undo
Undo the last text box action, only enabled if the cursor is in a text box.

Cut
Copy the selected text onto the clipboard, only enabled if the cursor is in a text box.

Copy
Undo the last text box action, only enabled if the cursor is in a text box.

Paste
Paste from the clipboard into the currently highlighted text box, only enabled if the cursor is in a text box.

Select All
Select all the rows in the memory table.

Select Highlighted
Select all the rows in the memory table that are highlighted.

Deselect All
Deselect all the rows in the memory table.

Deselect Highlighted

Deselect all the rows in the memory table that are highlighted.

Restore Display Order

Sorts the memory table the same was as it was when the application was started.

Setup

Communication Setup…

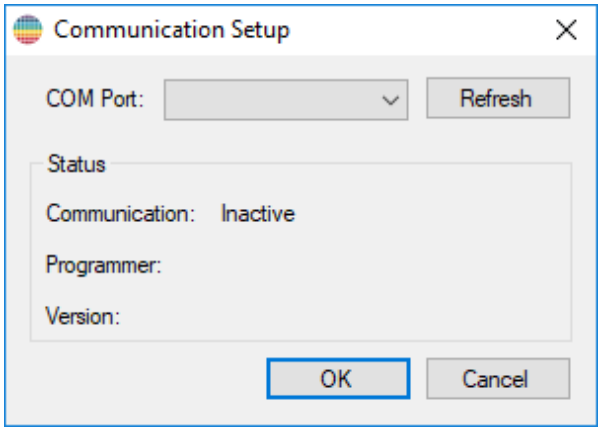


Figure 15: Communication Setup Dialog

COM Port Pull Down Menu

This popup menu displays the currently available COM ports. The COM port that is attached to an ASEK-20 or ASEK-21 needs to be selected.

Refresh

The refresh button will update the contents of the COM Port Pull Down Menu and then try to establish communication with the ASEK-20 if one is selected.

Status

The status will show the status of communications with the ASEK-20/21.

Communication

If communication with the ASEK-20/21 has been established, then this field will be “Active” otherwise it will be “Inactive”.

Programmer

If communication with the ASEK-20/21 has been established, then this field will be “ASEK-21” if communicating with an ASEK-21, “ASEK-20” if communicating with an ASEK-20 otherwise it will be blank.

Version

If communication has been established with the ASEK-20/21 then this field will display the version of the firmware in the ASEK-20/21.

OK

Save the com port chosen and close the dialog.

Cancel

Discard any changes made and close the dialog.

Device Setup…

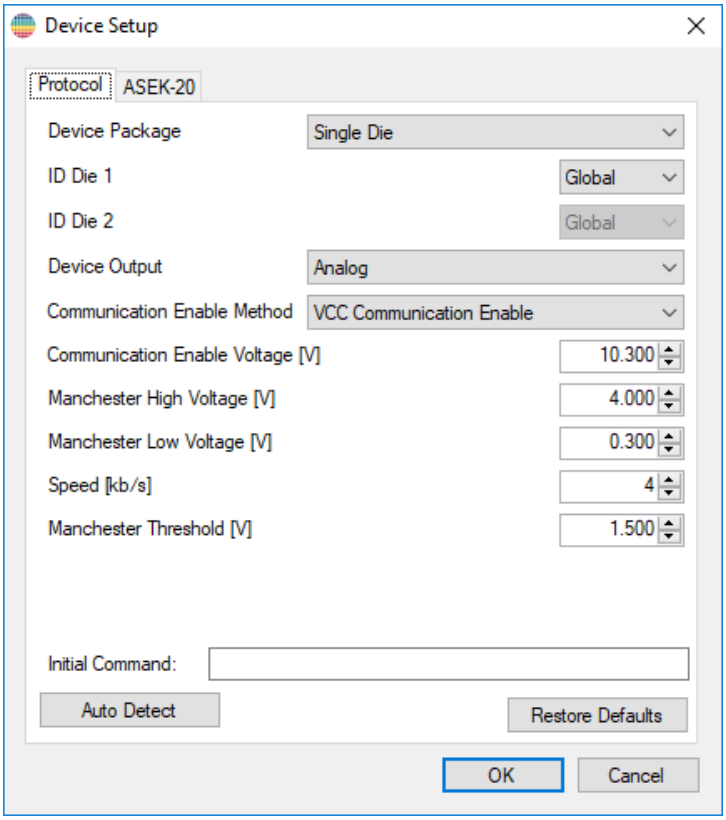


Figure 16: Device Setup, Analog Manchester Parameters

Device Package

The device output is a choice between Single Die or Dual Die.

ID Die 1

This is the ID used to communicate to die 1. The choices are:

- Global
- ID0
- ID1

ID Die 2

This is the ID used to communicate to die 2. The choices are:

- Global
- ID0
- ID1

Device Output

The device output is a choice between Analog, Digital with an Open Drain Driver or Digital with a Push-Pull Driver. When the choice is Analog the following controls are available:

Communication Method Popup Menu

This selects the method that the programmer will use to communicate to the A31315. The choices for Analog are:

- VCC Communication Enable
- Overdrive

Communication Enable Voltage [V] Text Entry Box

This is the voltage that Vcc will be set to when communicating with the A31315 when the communication method is VCC Communication Enable.

Manchester High Voltage [V] Text Entry Box

Used to set the voltage for the high level of the Manchester signal. The default is 4.0 Volts.

Manchester Low Voltage [V] Text Entry Box

Used to set the voltage for the low level of the Manchester signal. The default is 0.3 Volts.

Speed [kb/s] Text Entry Box

This is the bit rate that will be used when communicating with the A31315. The default is 4 kbps.

Manchester Threshold [V] Text Entry Box

This is the voltage that will be used to determine if the input is true or false when reading the Manchester signals. The default is 1.5 Volts.

Initial Command Text Entry Box

This is used for commands that need to be sent to the ASEK-20/21 when it is initialized.

Auto Detect

When clicked, the application will attempt to read the memory of the device and setup the communication parameters to facilitate communication.

Restore Defaults

When clicked, all the default values for the Manchester settings are restored.

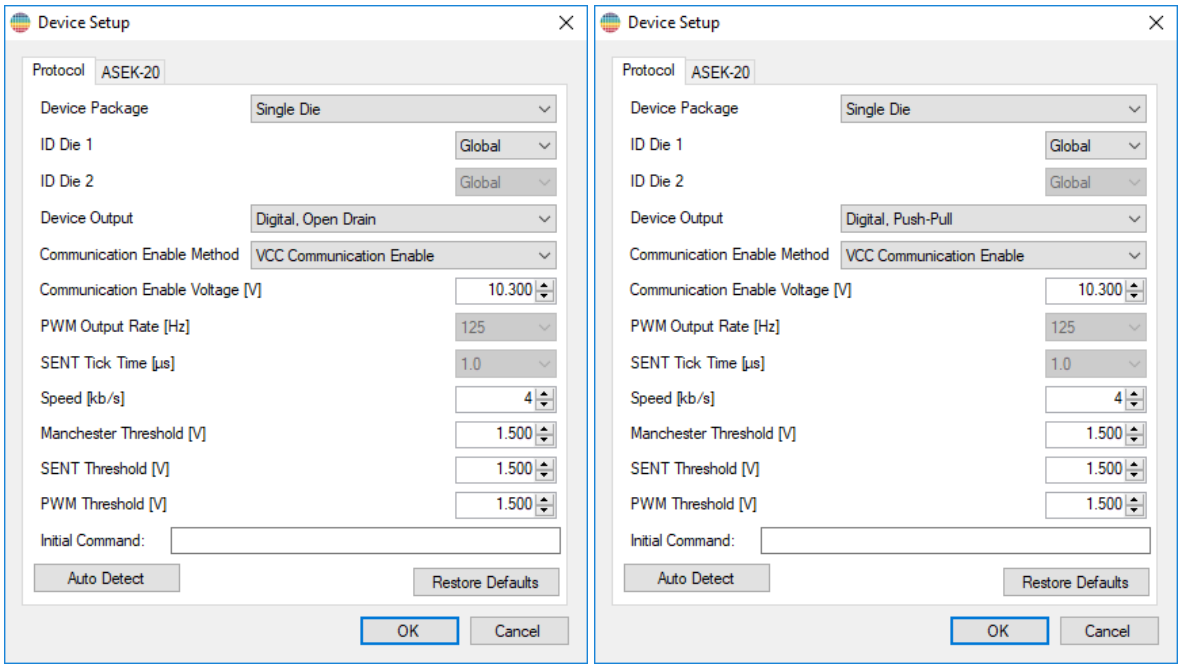


Figure 17: Device Setup, Digital Manchester Parameters

Device Output

The device output is a choice between Analog or Digital with an Open Drain Driver or Digital with a Push-Pull Driver. When the choice is Digital the following controls are available:

Communication Method Popup Menu

This selects the method that the programmer will use to communicate to the A31315. The choices for PWM/SENT are:

- VCC Communication Enable
- Auxiliary Interrupt Pulse (PWM)
- Auxiliary Interrupt Pulse (SENT)
- Overvoltage + Auxiliary Interrupt Pulse (PWM)
- Overvoltage + Auxiliary Interrupt Pulse (SENT)

Communication Enable Voltage [V] Text Entry Box

This is the voltage that Vcc will be set to when communicating with the A31315 when the communication method is VCC Communication Enable.

PWM Output Rate [Hz] Popup Menu

This should be set to the carrier frequency of the PWM that the A31315 is generating when the communication method is Auxiliary Interrupt Pulse (PWM) or Overvoltage + Auxiliary Interrupt Pulse (PWM).

SENT Tick Time [µs] Popup Menu

This should be set to the tick time of the SENT messages that the A31315 is generating when the communication method is Auxiliary Interrupt Pulse (SENT) or Overvoltage + Auxiliary Interrupt Pulse (SENT).

Speed [kb/s] Text Entry Box

This is the bit rate that will be used when communicating with the A31315. The default is 4 kbps.

Manchester Threshold [V] Text Entry Box

This is the voltage that will be used to determine if the input is true or false when reading the Manchester signals. The default is 1.5 Volts.

SENT Threshold [V] Text Entry Box

Used to set the threshold for determining the difference between a 1 and a 0 when performing a SENT read. The default is 1.5 Volts.

PWM Threshold [V] Text Entry Box

Used to set the threshold for determining the difference between a 1 and a 0 when performing a PWM read. The default is 1.5 Volts.

Initial Command Text Entry Box

This is used for commands that need to be sent to the ASEK-20/21 when it is initialized.

Auto Detect

When clicked, the application will attempt to read the memory of the device and setup the communication parameters to facilitate that.

Restore Defaults

When clicked, all the default values for the Manchester settings are restored.

ASEK-20

When the programmer is connected to an ASEK-20, this tab is shown.

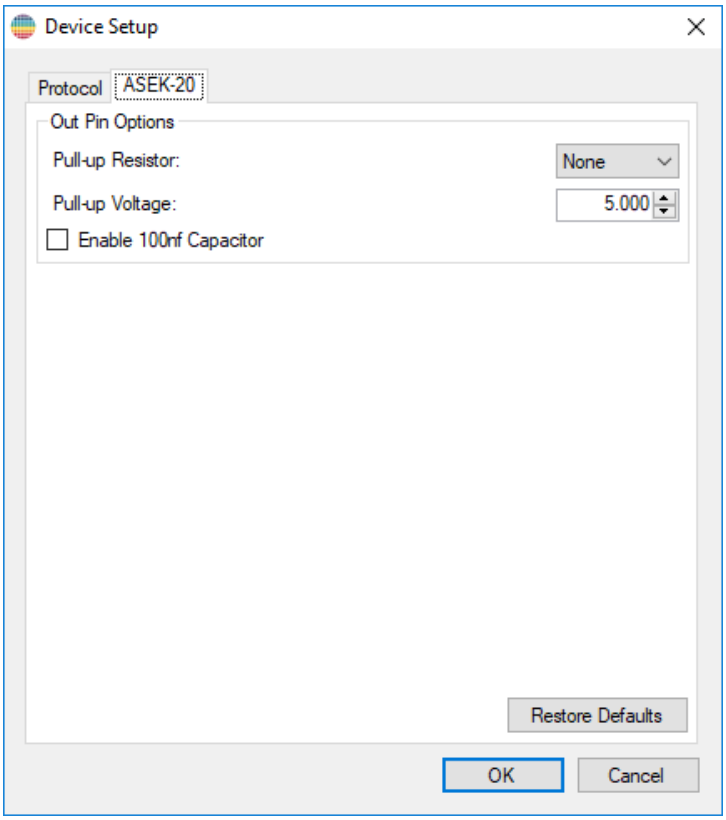


Figure 18: Device Setup with ASEK-20

Pull-Up Resister Popup Menu

Select none for no pull-up resister, 1.21K or 4.75K pull-up resister. This setting is automatically changed when switching between open-drain and push-pull modes. The default for open-drain is 1.21 K. The default for push-pull and Analog output is None.

Pull-Up Voltage

If a pull-up resister is selected this is the voltage that will be used to pull-up. The default is 5.0 Volts.

Enable 100nf Capacitor Check Box

This option connects the output to an 100nf capacitor. In Analog mode this is enabled by default. In Digital modes this is disabled by default.

Restore Defaults

When clicked, all the default values for the ASEK-20 settings are restored.

ASEK-21 Setup Options

When the programmer is connected to an ASEK-21, this tab is shown.

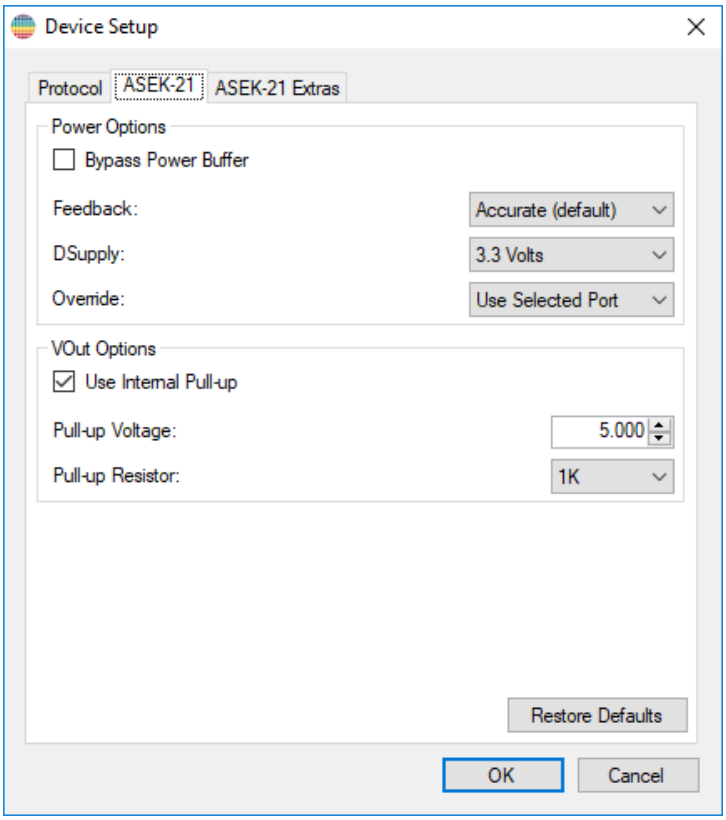


Figure 19: Device Setup with ASEK-21

Bypass Power Buffer Check Box

By default, the power supplied by the ASEK-20 is buffered internally by the ASEK-21. This allows higher current supply. This check box allows that buffer to be bypassed and the power to come directly from the ASEK-20. When checked, the power is limited to what the ASEK-20 can supply (about 40 mA).

Feedback Pull Down Menu

When the power is buffered by the ASEK-21, one of three feedback loops can be used. The first, **Stable** is the most stable but the voltage will decrease with the current draw (about 10mV per mA). The second is **Accurate** which is the default. The third is **External** which uses the VCC_S from the module under test. This is the most accurate but the least stable.

DSupply Pull Down Menu

The DSupply pin can supply power separate from the VCC lines. It can only be one of four values and they are:

- No Voltage Supplied
- 5 Volts
- 3.3 Volts
- 2.7 Volts

Override Pull Down Menu

The Override is used to select which supply power and ground lines to use and can be separate from the Out lines. It can only be one of five values and they are:

- Use Selected Port – Always use the power and ground lines specified by the port control.
- Use Port 1 – Always use the power and ground lines on port 1
- Use Port 2 – Always use the power and ground lines on port 2
- Use Port 3 – Always use the power and ground lines on port 3
- Use Port 4 – Always use the power and ground lines on port 4

Use Internal Pull-up Check Box

When checked, the Out line is pulled up by the designated resister by the chosen voltage.

Pull-up Voltage Text Entry Box

Selects the voltage that Out will be pulled up to.

Pull-up Resister Pull Down Menu

Selects either the 1K or 4.75K pull-up resister.

Restore Defaults

When clicked, all the default values for the ASEK-21 settings are restored.

ASEK-21 Extra Options

When the programmer is connected to an ASEK-21, this tab is shown.

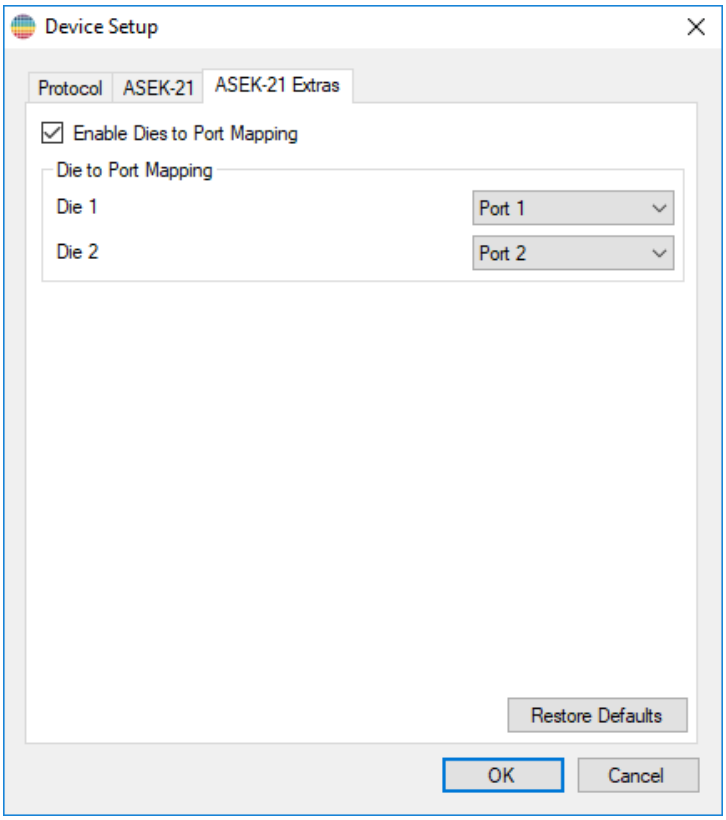


Figure 20: Device Setup with ASEK-21 Extras

Enable Dies to Port Mapping Check Box

When checked, which port is used is controlled by the die selection.

Die 1 Pull Down Menu

When “Enable Dies to Port Mapping” is checked, the port menus are enabled and allow ports 1 to 4 to be selected when die 1 is selected from the die selection pop menu.

Die 2 Pull Down Menu

When “Enable Dies to Port Mapping” is checked, the port menus are enabled and allow ports 1 to 4 to be selected when die 2 is selected from the die selection pop menu.

Restore Defaults

When clicked, all the default values for the ASEK-21 Extras settings are restored.

OK

Save the values chosen and close the dialog.

Cancel

Display as Decimal

Display the field’s code and the digital output values as decimal.

Display as Hexadecimal

Display the field's code and the digital output values as hexadecimal.

Extended Mode

When selected, two tabs are added to allow reading and writing of the Shadow and Volatile Registers.

Short Stroke Trimming Diagnostics

Enable the collection of diagnostics information to help with the debugging of short stroke trimming problems. Once the Position 2 button has been clicked and the short stroke trimming calculations have been completed, a save file browser window will appear to allow the user to name the file to save the diagnostics information into. This file should be sent to Allegro to help identify the problem.

Scripts

Run Script…

Allows the user to specify and run scripts written in the Allegro Script Language, C# or Visual Basic.

Any scripts in the directories "C:\ProgramData\Allegro MicroSystems\A31315 Samples Programmer\Scripts" and "C:\Users\{USER NAME}\AppData\Local\Allegro MicroSystems\A31315 Samples Programmer\Scripts" will be added to the menu so that they can be run just by selecting them.

A description of how to script is contained an a section at the end of this document.

Help

View Help

Opens the help viewer and displays the help file for Allegro A31315 Samples Programmer.

A31315 Registers Diagram

Opens a window and displays the A31315 register diagram.

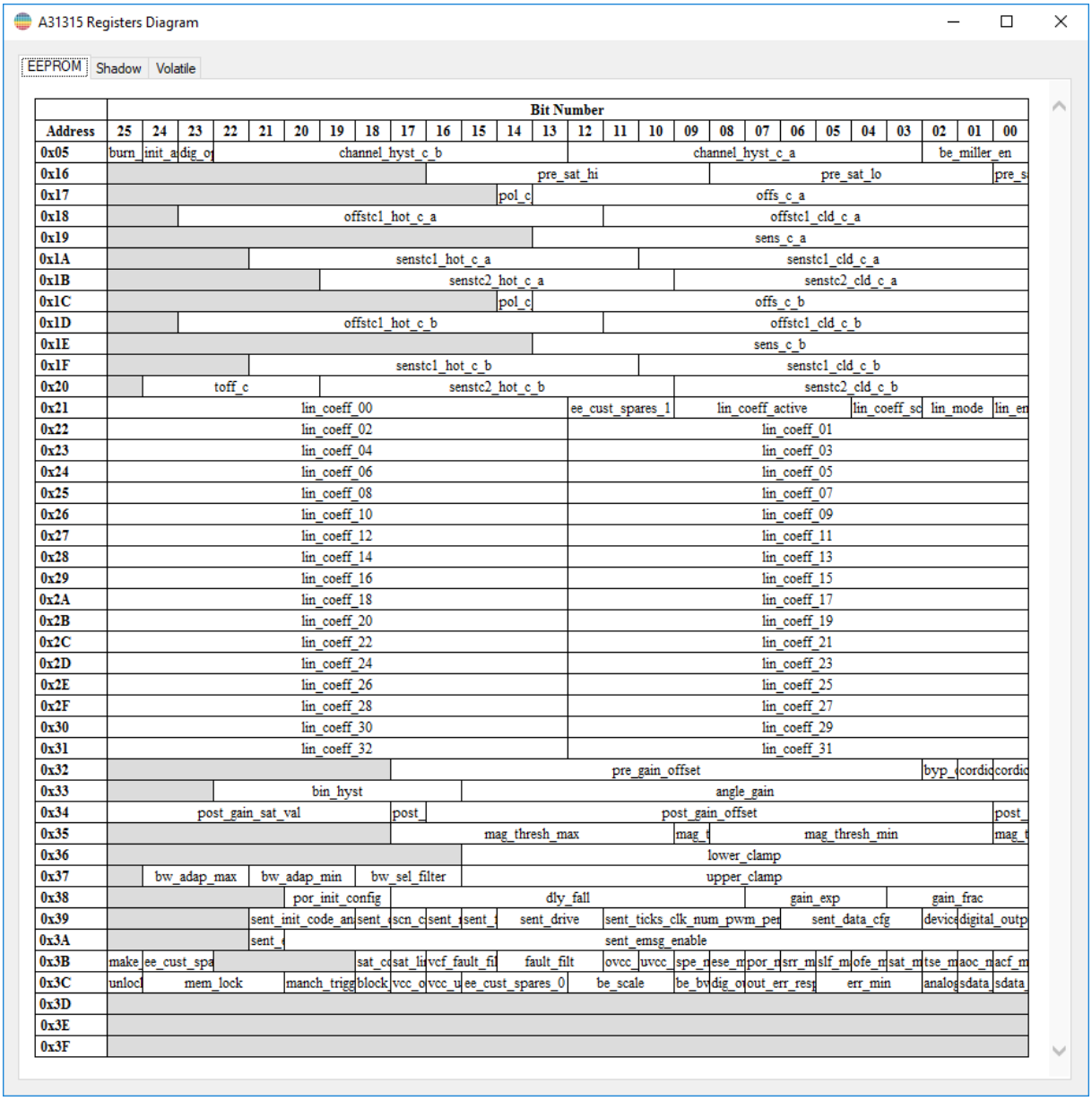


Figure 21: A31315 Register Diagram Window

Allegro MicroSystems Software Web Site

Opens the web browser to the Allegro MicroSystems Software Web site.

Allegro MicroSystems Web Site

Opens the web browser to the Allegro MicroSystems Web site.

About Allegro A31315 Samples Programmer

Figure 22: About Allegro A31315 Samples Programmer Dialog Box

Displays the version of the application and the Allegro specific DLLs.

Status Bar

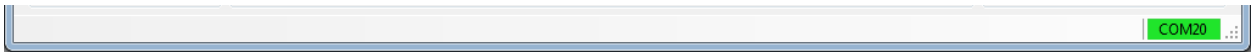


Figure 23: Status Bar, ASEK-20

Status Field

The status field displays the current operations that are ongoing and any error messages.

Communication Status Indicator

The colored rectangle on the right hand side of the status bar displays the communication status. If it is green then there is communication with the ASEK otherwise it will be red. If the communication is with an ASEK-20 or ASEK-21 then the port will be displayed on the status indicator.

Power

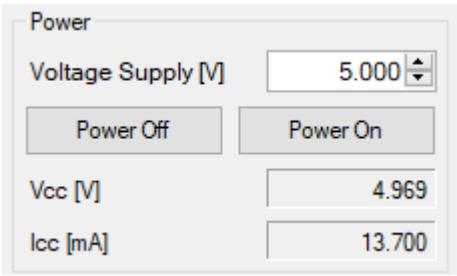


Figure 24: Power Group

Voltage Supply Text Box

The “Voltage Supply” text box sets the voltage that will be supplied to the part. Any changes in value will not be used until the power on button is pressed.

Power On Button

Sets the supply voltage for the device to the value given in the Voltage Supply text box and then turns the power on and sends the access code and checks to see if access is granted. If the power is already on, it will turn the power off then turn the power back on.

If the Ctrl key is held down when clicking this button, the power is applied to the device but the access code is not sent.

Power Off Button

Turns off the power to the device.

Vcc Text Box

The “Vcc” text box displays the current value of the supply voltage of the device.

Icc Text Box

The “Icc” text box displays the current value of the supply current of the device. This is an un-calibrated reading and should be used as a qualitative indicator.

Die Selection

When in dial die mode, this popup allows the selection of which die is read or written to.

Output Group

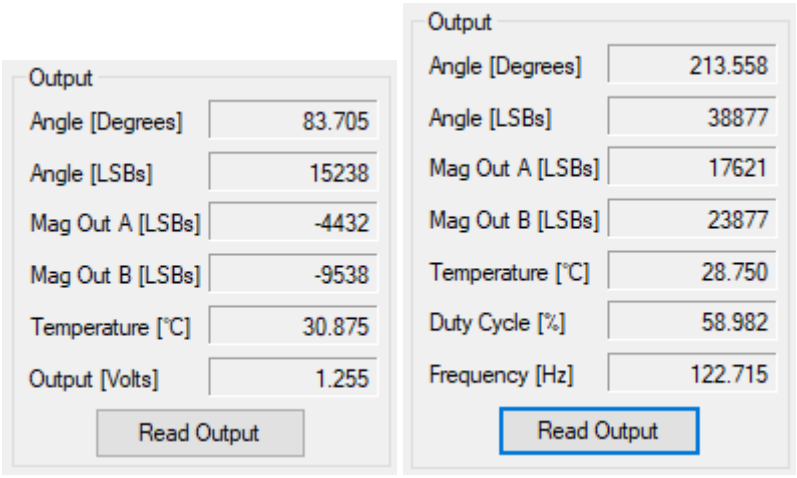


Figure 25: Output Group, Analog and Digital

Read Output Button

The **Read Output** button reads Vcc, Icc, and the output values from the selected die (if dual die).

Angle [Degrees] Text Box

This text box displays the angle.

Angle [LSBs] Text Box

This text box displays the angle.

Mag Out A [LSBs] Text Box

This text box displays the magnitude of the output of channel A.

Mag Out B [LSBs] Text Box

This text box displays the magnitude of the output of channel B.

Temperature [°C] Text Box

This text box displays the temperature.

Output [Volts] Text Box (Analog Only)

This text box displays the voltage output by the device.

Duty Cycle [%] Text Box (SENT/PWM Only)

This text box displays the duty cycle output by the device.

Frequency [Hz] Text Box (SENT/PWM Only)

This text box displays the carrier frequency of the PWM output by the device.

Demo

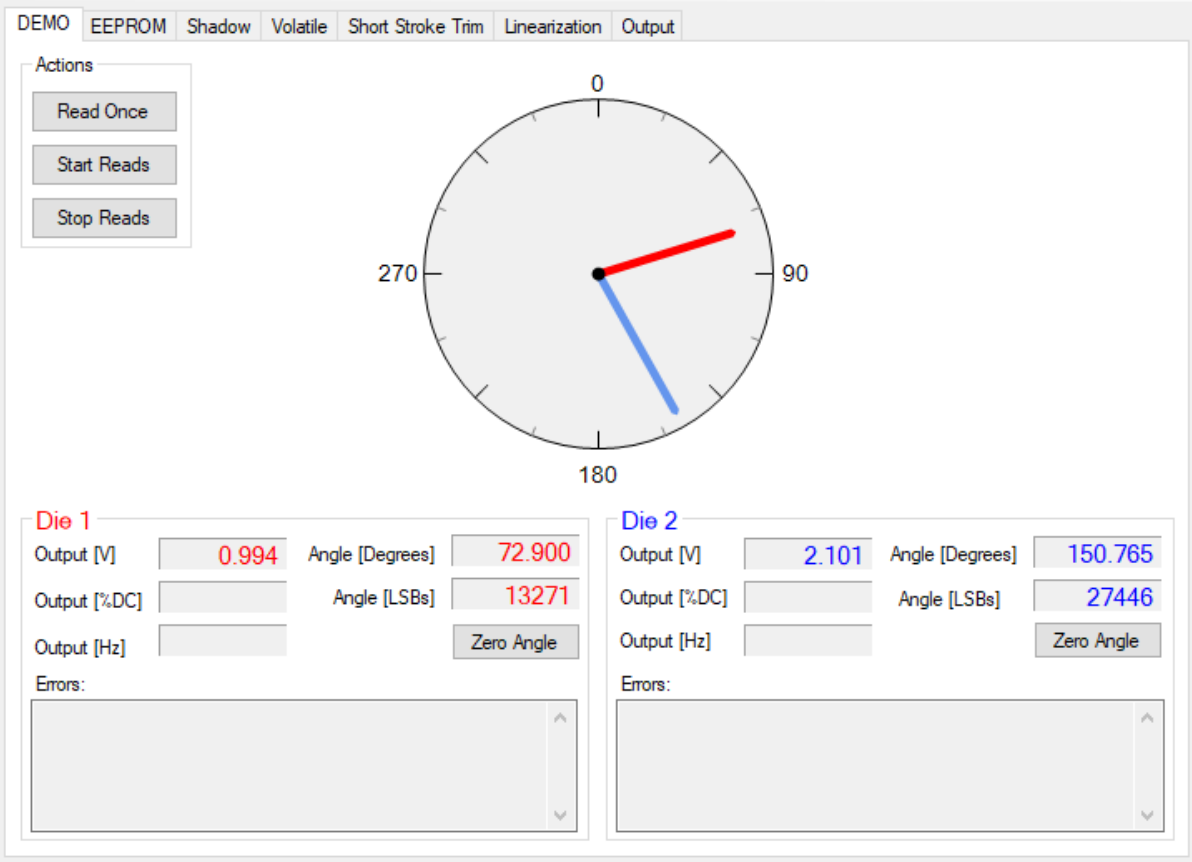


Figure 26: Demo

Reading from the Device

1. Click **Read Output**. Angle, output (voltage or PWM) and the temperature fields will be updated.
2. Clicking **Read Once** will update the angle, output (voltage or PWM) and the temperature fields.
3. Clicking **Start Read** will continuously update the angle, output (voltage or PWM) and the temperature fields until **Stop Reads** is clicked.

Zeroing the Angle

1. Click **Zero Angle** to read the angle and then set pre_gain_offset so that the angle read will be zero.

Reference

Read Once Button

Update the angle, output (voltage or PWM) and the temperature fields in the window. If dual die is selected, updates both die.

Start Reads Button

Start a periodic update for angle, output (voltage or PWM) and the temperature fields on the page. If dual die is selected, updates both die.

Stop Reads Button

Stop the periodic update for angle, output (voltage or PWM) and the temperature fields on the page. If dual die is selected, updates both die.

Die # Group

The information specific to the die are displayed in the following fields. If single die is selected, then all of the fields in the Die 2 group are grayed out.

Output [V] Text Box

This is the voltage value read from the die if analog output mode is selected.

Output [%DC] Text Box

This is the PWM duty cycle value read from the die if the digital output mode is selected.

Output [Hz] Text Box

This is the PWM carrier frequency value read from the die if the digital output mode is selected.

Angle [Degrees] Text Box

This is the angle value read from the die and displayed in degrees.

Angle [LSBs] Text Box

This is the angle value read from the die and displayed in degrees.

Zero Angle Button

Reads the current angle value then programs the A31315 to make it read zero.

Errors Text Box

Contains the list of error flags read from the die.

EEPROM

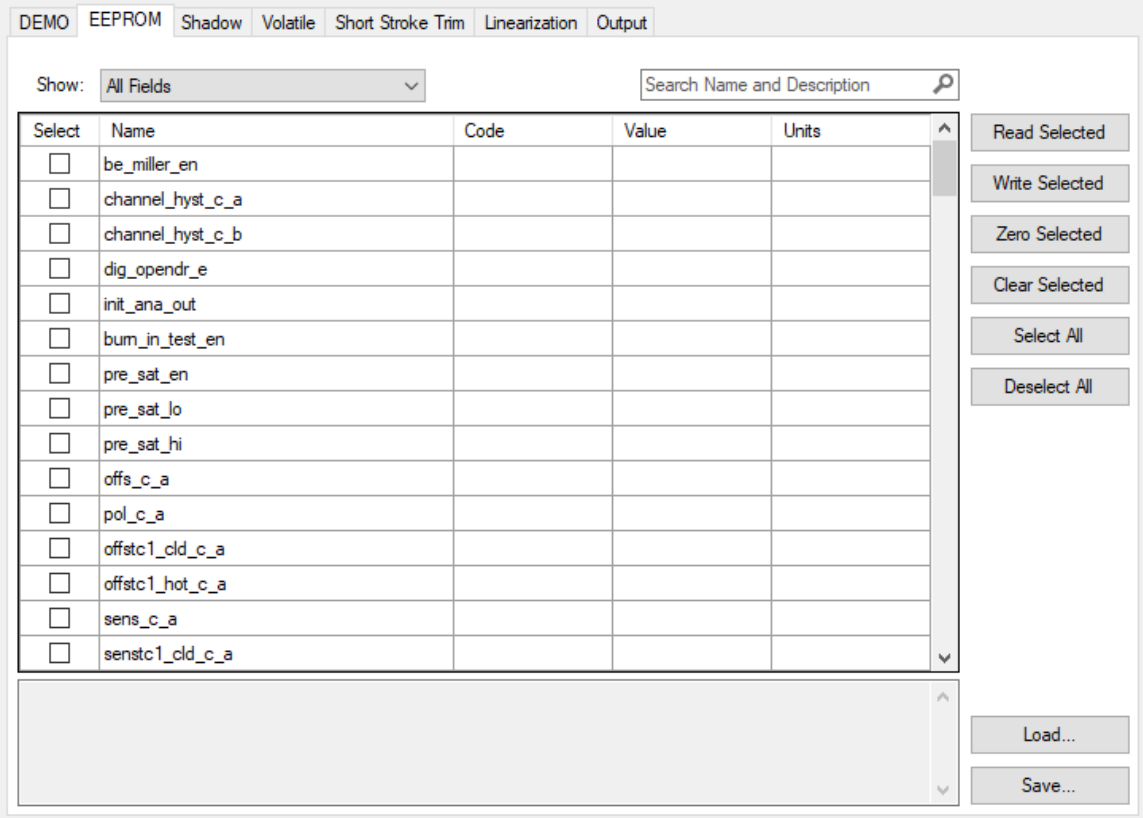


Figure 27: EEPROM

Show Popup Control

Used to toggle the display of the Memory field table between All Memory Locations, All Fields, Linearization Fields or the Short Stroke Fields in the EEPROM.

Search Name and Description Test Box

Text entered into this text box will be searched for in the names and descriptions of the fields and memory locations.

Table

The table displays the fields and memory locations in a spreadsheet.

Select

This column is used to select the rows which the buttons are to operate on.

Address (Only for Memory Locations)

Displays the address of the memory location.

Name

Displays the name of the field or memory location. If the mouse is hovered over the cell, a longer version of the name is displayed in a tool tip.

Code

The code column displays the decimal or hexadecimal version of the data in the field or memory location. If the field or memory location is writable, double clicking on the cell will allow the value to be changed. The new value is not written to the device until the **Write Selected** button is pressed. When the cursor is held over the cell, any documentation about the range of values it is display in a tool tip.

Value

The value column displays a version of the data that has been interpreted in the units that are defined for the field or memory location. For example, the lin_enable field is displayed as true or false. If the field or memory location is writable, double clicking on the cell will allow the value to be changed. The new value is not written to the device until the **Write Selected** button is pressed. When the cursor is held over the cell, any documentation about the range of values it is display in a tool tip. This column is only displayed for fields.

Units

If the value column has units, then the units are displayed in this column. This column is only displayed for fields.

Read Selected

Read all the selected rows from the device.

Write Selected

Write all the data from the selected rows to the device.

Zero Selected

Put a zero into the code column of the selected rows. The value is not written to the device until **Write Selected** is pressed.

Clear Selected

Clear the code and value columns of the selected rows.

Select All

Select all the rows in the table.

Deselect All

Deselect all the rows in the table.

Load

Load the field or memory location values from a file.

Save

Save the selected field or memory location values to a file.

Shadow

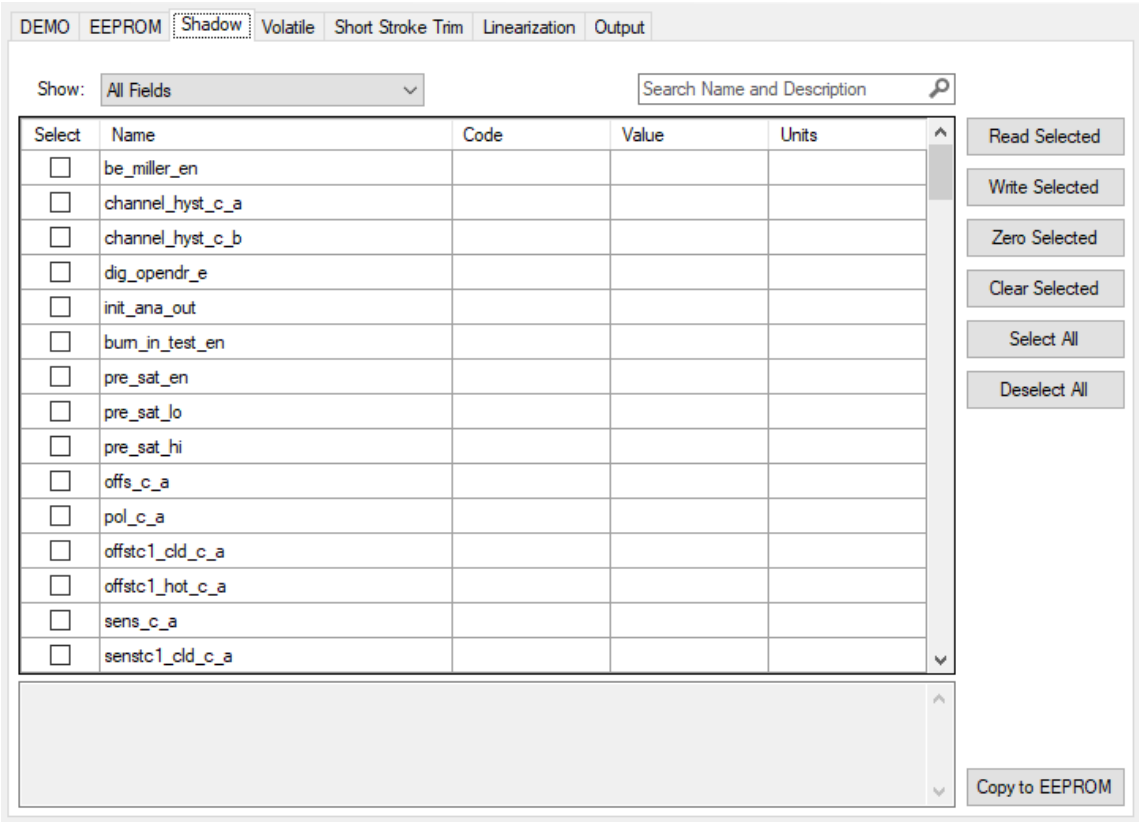


Figure 28: Shadow

Show Popup Control

Used to toggle the display of the Memory field table between All Memory Locations and All Fields in the EEPROM.

Search Name and Description Test Box

Text entered into this text box will be searched for in the names and descriptions of the fields and memory locations.

Table

The table displays the fields and memory locations in a spreadsheet.

Select

This column is used to select the rows which the buttons are to operate on.

Address (Only for Memory Locations)

Displays the address of the memory location.

Name

Displays the name of the field or memory location. If the mouse is hovered over the cell, a longer version of the name is displayed in a tool tip.

Code

The code column displays the decimal or hexadecimal version of the data in the field or memory location. If the field or memory location is writable, double clicking on the cell will allow the value to be changed. The new value is not written to the device until the **Write Selected** button is pressed. When the cursor is held over the cell, any documentation about the range of values it is display in a tool tip.

Value

The value column displays a version of the data that has been interpreted in the units that are defined for the field or memory location. For example, the lin_enable field is displayed as true or false. If the field or memory location is writable, double clicking on the cell will allow the value to be changed. The new value is not written to the device until the **Write Selected** button is pressed. When the cursor is held over the cell, any documentation about the range of values it is display in a tool tip. This column is only displayed for fields.

Units

If the value column has units, then the units are displayed in this column. This column is only displayed for fields.

Read Selected

Read all the selected rows from the device.

Write Selected

Write all the data from the selected rows to the device.

Zero Selected

Put a zero into the code column of the selected rows. The value is not written to the device until **Write Selected** is pressed.

Clear Selected

Clear the code and value columns of the selected rows.

Select All

Select all the rows in the table.

Deselect All

Deselect all the rows in the table.

Copy to EEPROM

Copies the selected fields to the corresponding fields in the EEPROM table.

Volatile (Extended Mode Only)

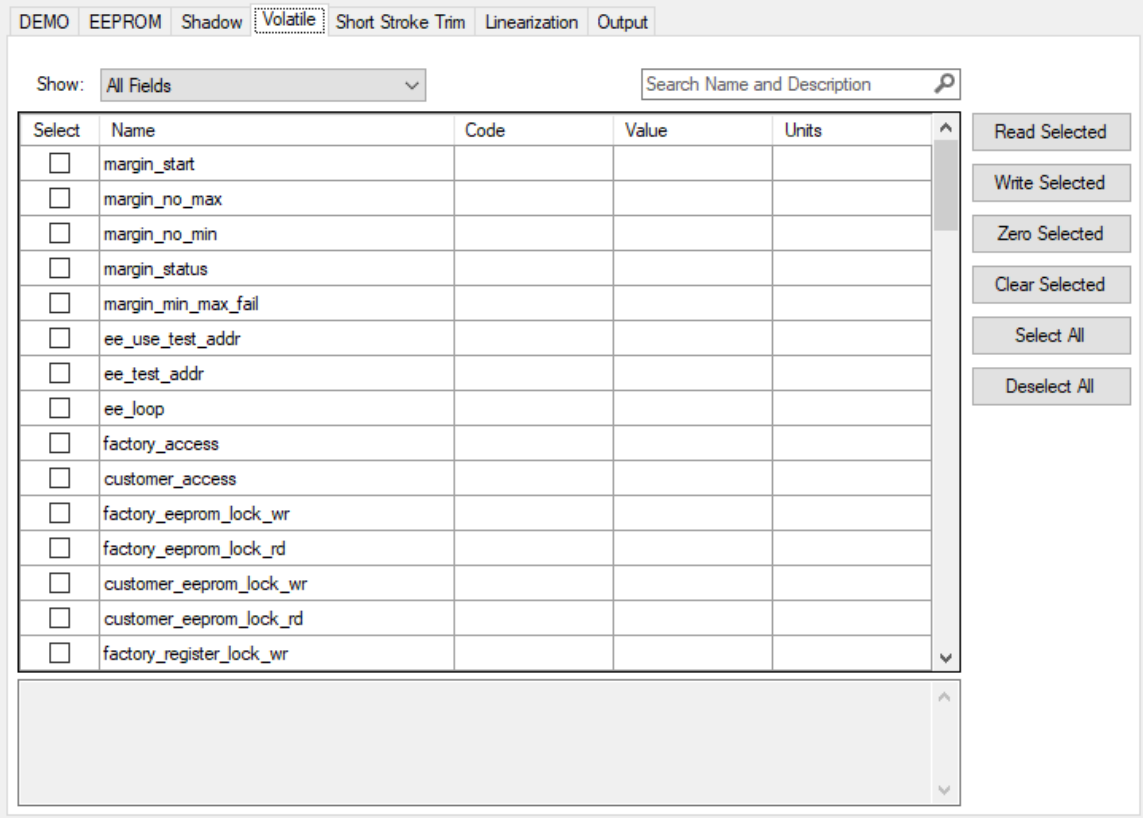


Figure 29: Volatile

Show Popup Control

Used to toggle the display of the Memory field table between All Memory Locations and All Fields in the EEPROM.

Search Name and Description Test Box

Text entered into this text box will be searched for in the names and descriptions of the fields and memory locations.

Table

The table displays the fields and memory locations in a spreadsheet.

Select

This column is used to select the rows which the buttons are to operate on.

Address (Only for Memory Locations)

Displays the address of the memory location.

Name

Displays the name of the field or memory location. If the mouse is hovered over the cell, a longer version of the name is displayed in a tool tip.

Code

The code column displays the decimal or hexadecimal version of the data in the field or memory location. If the field or memory location is writable, double clicking on the cell will allow the value to be changed. The new value is not written to the device until the **Write Selected** button is pressed. When the cursor is held over the cell, any documentation about the range of values it is display in a tool tip.

Value

The value column displays a version of the data that has been interpreted in the units that are defined for the field or memory location. For example, the lin_enable field is displayed as true or false. If the field or memory location is writable, double clicking on the cell will allow the value to be changed. The new value is not written to the device until the **Write Selected** button is pressed. When the cursor is held over the cell, any documentation about the range of values it is display in a tool tip. This column is only displayed for fields.

Units

If the value column has units, then the units are displayed in this column. This column is only displayed for fields.

Read Selected

Read all the selected rows from the device.

Write Selected

Write all the data from the selected rows to the device.

Zero Selected

Put a zero into the code column of the selected rows. The value is not written to the device until **Write Selected** is pressed.

Clear Selected

Clear the code and value columns of the selected rows.

Select All

Select all the rows in the table.

Deselect All

Deselect all the rows in the table.

Short Stroke Trim

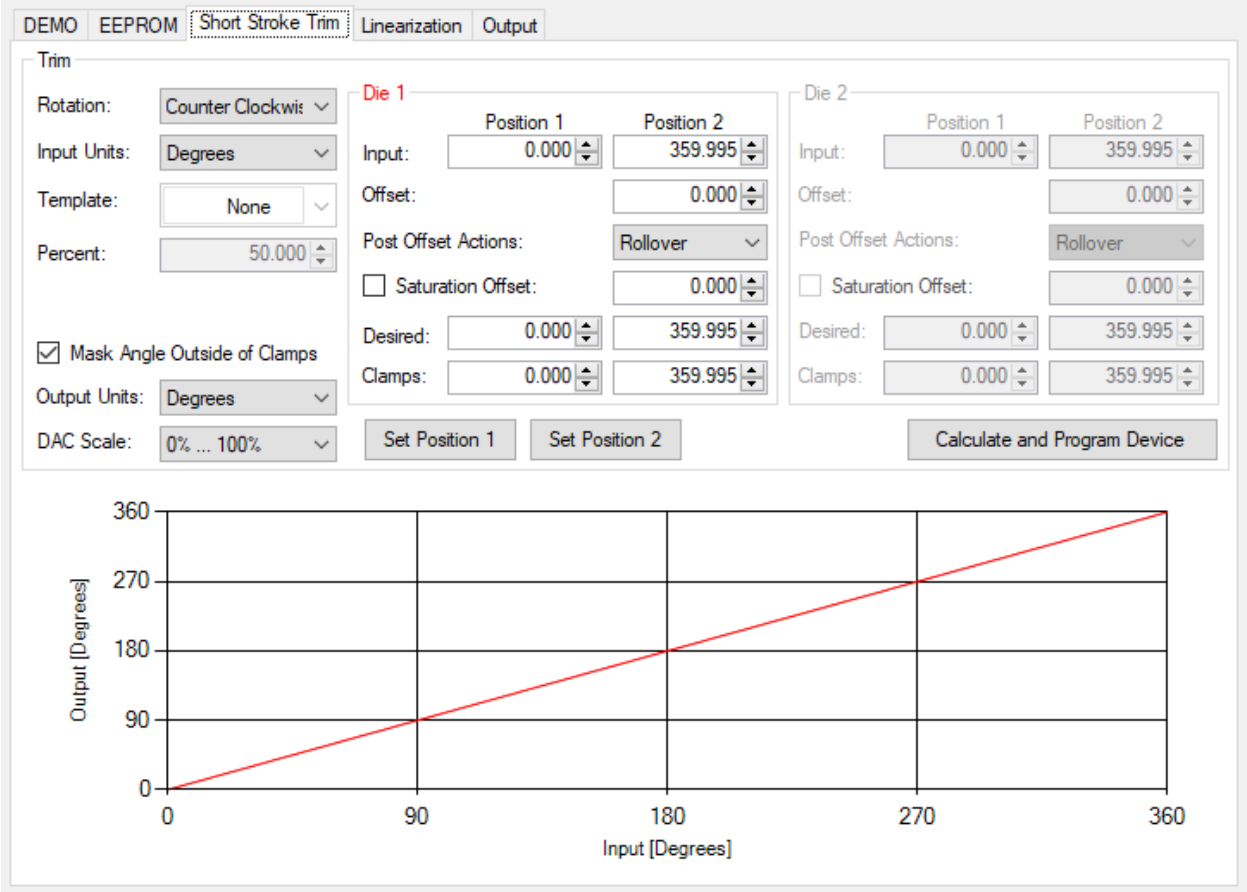


Figure 30: Short Stroke

The short stroke trim tab is used when a full rotation of the target is not possible or desirable.

Program Short Stroke

1. Determine the type of short stroke:
    a. If the curve for the die is to be rising, enter the lesser value in desired position 1 and the greater value in desired position 2.
    b. If the curve for the die is to be falling, enter the greater value in desired position 1 and the lesser value in desired position 2.

    If dual die is required, fill in the values for both die.

2. If clamps are desired, fill in the clamp values for position 1 (Low Clamp) and position 2 (High Clamp).
3. Move the magnet to Position 1.
4. Click **Set Position 1**.
5. Move the magnet to Position 2.
6. Click **Set Position 2**.

7. Click **Calculate and Program Device.**

Reference

Rotation Direction

This pop-up menu selects in which direction the magnetic field rotates to cause an increase in angle. The choices are “Clockwise” or “Counter Clockwise”.

Input Units Pop-up Menu

This pop-up menu selects which units will be used in the input text boxes and displayed in the Input Angle controls. The options are Degrees, Percentage and LSBs.

Template Pop-up Menu

This pop-up menu is enabled when dual die is selected and selects how the second die will be handled. The options are:

- None – No template is used. The user has full control over what is programmed into the second die.
- Crossing – The second die will be set to be an inverse version of the first die.
- Reduced – The second die will be a reduced version of the first die and the amount will depend on the value in the percent control.

Percent Numeric Text Box

When **Reduced** is selected from the **Template** pop-up menu, this controls what percentage the second die output will be in relationship to the first die.

Mask Angle Outside of Clamps Checkbox

When checked, the AOC flag will be masked.

Output Units Pop-up Menu

This pop-up menu selects which units will be used in the desired and limit text boxes and displayed in the Output Angle controls. When Analog is selected as the device output, the options are Degrees, Percentage and Volts. When PWM is selected as the device output, the options are Degrees, Percentage and Duty Cycle.

DAC Scale Pop-up Menu (Voltage output only)

If the device output is voltage, this pop-up menu selects the range of DAC values. The possible values are:

- 0% - 100%
- 4% - 96%
- 5% - 95%
- 6% - 94%
- 7% - 93%

- 8% - 92%
- 10% - 90%
- 15% - 85%

Input Position 1 Text Box
The reading from the device at position 1.

Input Position 2 Text Box
The reading from the device at position 2.

Offset Numeric Text Box
The offset will shift the start of the output by this amount divided by the gain.

Post Offset Actions Popup Menu
There are 2 post gain actions:

1. Rollover – The output will wrap from highest value to lowest or from lowest value to highest.
2. Saturate – The output will stay at the highest value.

Saturation Offset Check Box
Enable the saturation.

Saturation Offset Numeric Text Box
The is the value where the output will transition from high to low if the output is saturated.

Desired Position 1 Numeric Text Box
After programming, when the input is at position 1, this is the value that will be output by the A31315.

Desired Position 2 Numeric Text Box
After programming, when the input is at position 2, this is the value that will be output by the A31315.

Clamps Position 1 Numeric Text Box
After programming, when the output value is less than this value, this is the value that will be output by the A31315.

Clamps Position 2 Numeric Text Box
After programming, when the output value is greater than this value, this is the value that will be output by the A31315.

Set Position 1 Button
Sets position 1. If dual die than reads position 1 for both die 1 and die 2.

Set Position 2 Button
Sets position 2. If dual die than reads position 2 for both die 1 and die 2.

Calculate and Program Button

Calculate the parameters and write them to the device. If dual die than calculates the desired outputs for both die 1 and die 2.

Output Graph

Shows the output of the A31315. Shows the expected output curve(s) with the settings that have been entered.

Linearization

Disabled Linearization

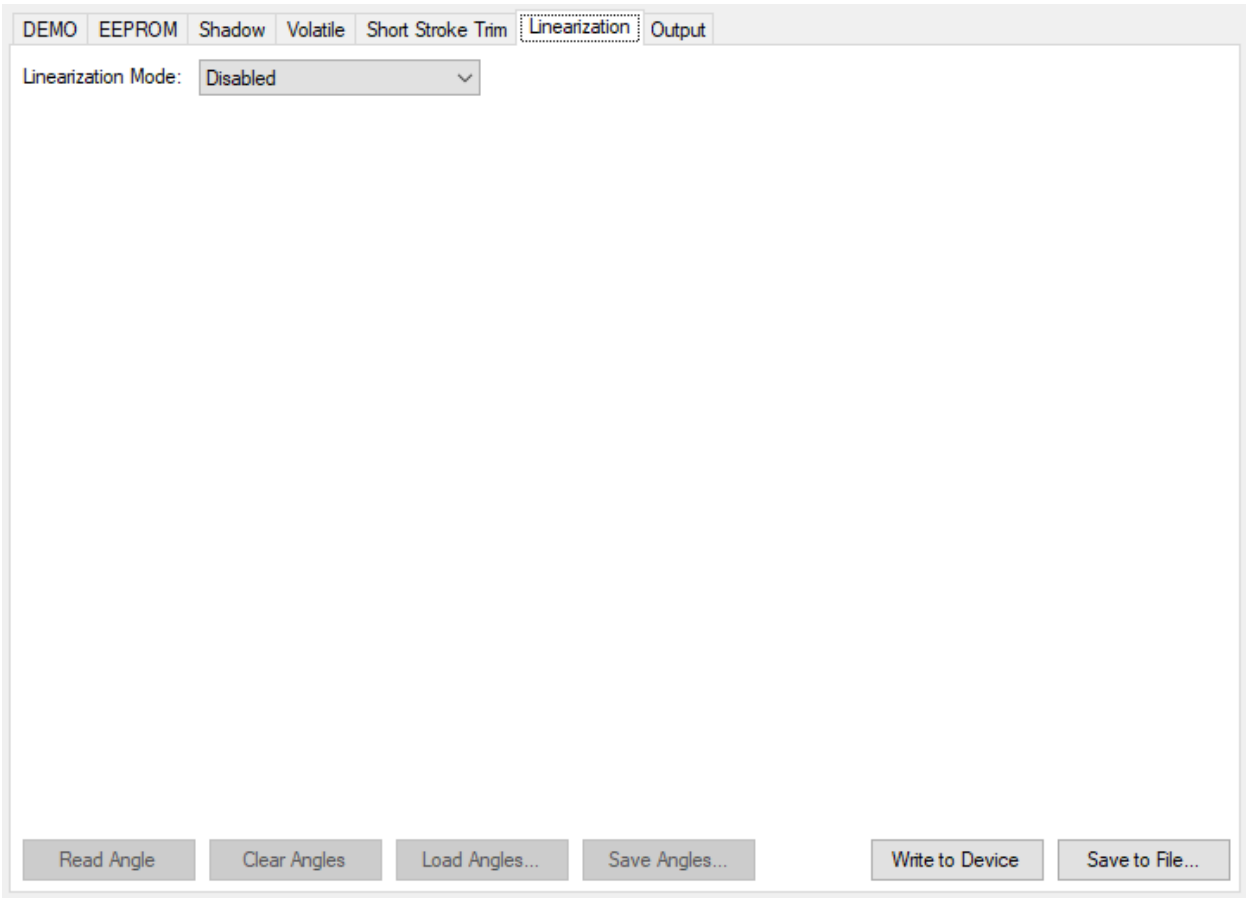


Figure 31: Linearization – Disabled

This mode disables linearization.

Write to Device

The linearization parameters needed to disable linearization are written to the device. If the device is a dual die device then both die will have linearization disabled.

Save to File…

Saves the parameters needed to disable linearization. If the device is a dual die device then two files will be generated with the name is the one selected with "_die1" or "_die2" appended to the filename.

Fixed Point Linearization

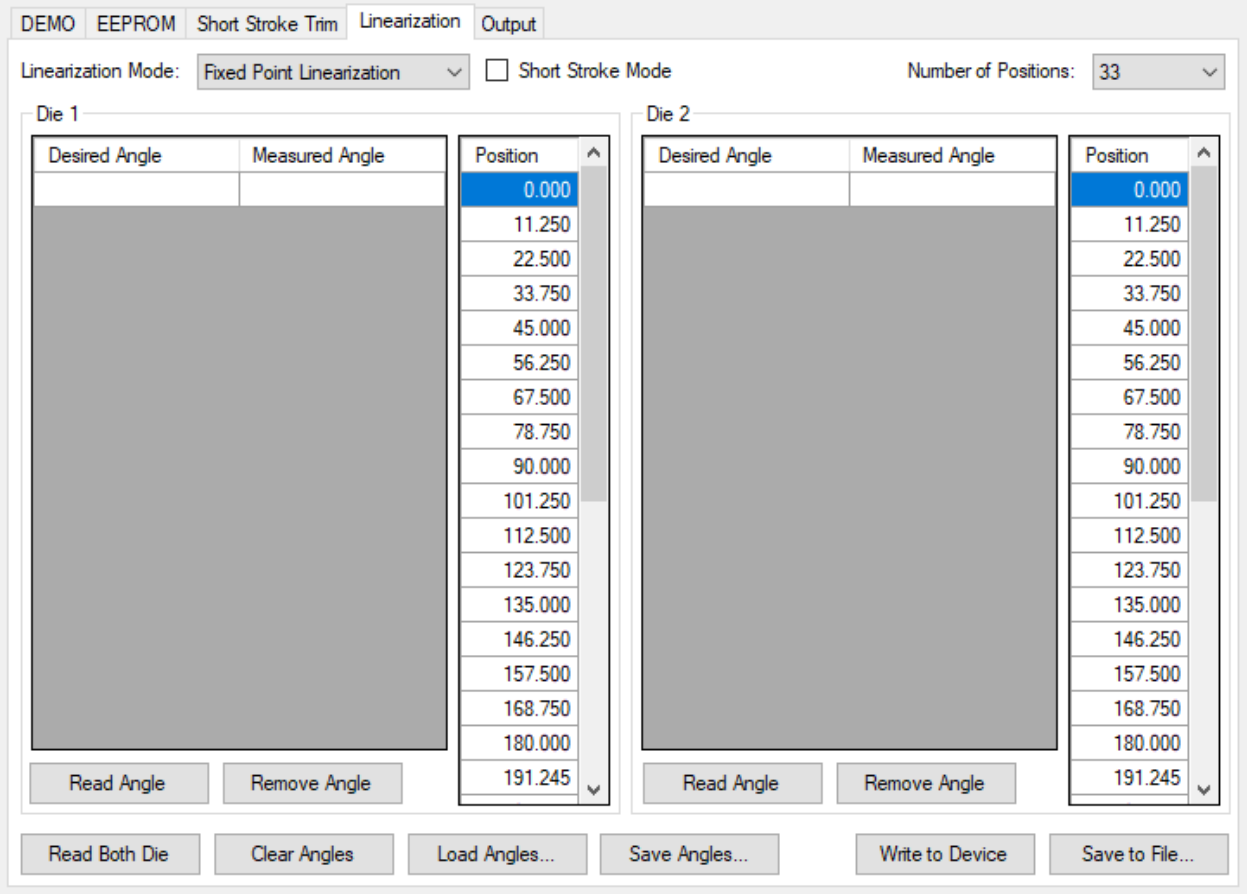


Figure 32: Linearization - Fixed Point

To linearize the device, click on the **Linearization** tab

1. If the device had been short stroke trimmed then check **Short Stroke Mode.** This should improve the accuracy of the calculated coefficients around the end points of the short stroke.
2. Select the number of positions (coefficients).
3. The angle data needs to be entered into one of the left hand tables. To read the angle data in from a file:
    a. Click **Load Angles…** at the bottom of the angles table. A file browser dialog box will appear.
    b. Locate the file containing the angle data and select it. The **Desired Angle** and **Measured Angle** rows will be filled in.
4. If the angle data is to be read from the device:

a. Fill in the **Desired Angle** for the first position, then move the magnet to the first position and click **Read Angle**. If a dual device is being used then if **Read Both Die** is hit then the angle data is read for both die and inserted into the tables.
b. Move the magnet to the next locations. At each location, fill in the **Desired Angle** and then click **Read Angle**.

5. If the graph looks correct, click **Write to Device**. The programmer will write the linearization data to the device and then copy the linearization data to the EEPROM.

Reference

Number of Positions Popup Menu

Selects the number of positions (coefficients) that will be generated.

Input Angle Table

This is a table(s) of encoder values and read angles. The table for Die 2 is only writable when using a dual die device.

Position Table

This is a table of where the coefficients will be positioned. These fields will not be modifiable.

Read Angle

Read the angle from the A31315 and insert it into the table at the row that is selected and then moves the selection to the next row.

Remove Angle

Removes the row containing the selection from the table.

Read Both Die (Dual die device only)

Read the angles from both dies of the A31315 and insert them into the tables at the row that is selected and then moves the selection to the next row.

Load Angles…

Read in the angle input file (file format detailed later in this document).

Clear Angles

Clear the angles from the angle table.

Save Angles…

Save the angles in the angle table in a file.

Write to Device

The linearization parameters are written to the device. If the device is a dual die device then both die will have linearization enabled and the coefficients written.

Save to File…

Saves the parameters needed to set the linearization mode that is defined on this tab. If the device is a dual die device then two files will be generated with the name is the one selected with "_die1" or "_die2" appended to the filename.

Fixed Point Binning

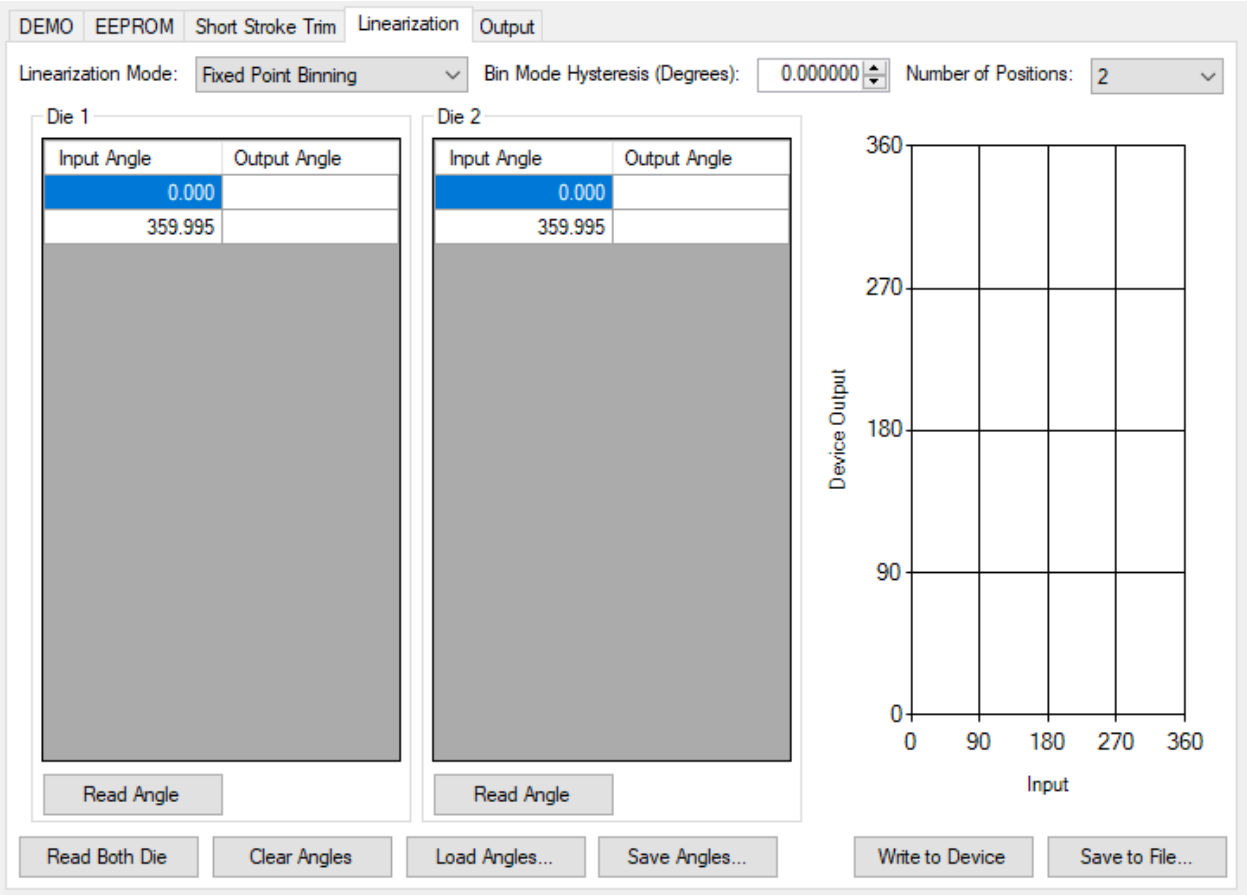


Figure 33: Binning - Fixed Point

To linearize the device, click on the **Linearization** tab

1. Select the number of bins from **Number of Positions.**
2. The angle data needs to be entered into one of the left hand tables. To read the angle data in from a file:
    a. Click **Load Angles…** at the bottom of the angles table. A file browser dialog box will appear.
    b. Locate the file containing the angle data and select it. The **Output Angle** rows will be filled in.
3. If the angle data is to be read from the device:
    a. Move the magnet to the first position and click **Read Angle** or if on a dual die device **Read Both Die**.

b. Move the magnet to the next locations. At each location, click **Read Angle** or if on a dual die device **Read Both Die**.

4. If the graph looks correct, click **Write to Device**. The programmer will write the linearization data to the device and then copy the linearization data to the EEPROM.

Reference

Number of Positions Popup Menu

Selects the number of positions (coefficients) that will be generated.

Input Angle Table

This is a table(s) of Input Angles which are fixed and read only and the output angles The table for Die 2 is only writable when using a dual die device.

Bin Mode Hysteresis (Degrees): Numeric Text Box

Use this field to set the desired hysteresis for the input.

Read Angle

Read the angle from the A31315 and insert it into the table at the row that is selected and then moves the selection to the next row.

Read Both Die (Dual die device only)

Read the angles from both dies of the A31315 and insert them into the tables at the row that is selected and then moves the selection to the next row.

Load Angles…

Read in the angle input file (file format detailed later in this document).

Clear Angles

Clear the angles from the angle table and clear the harmonics table.

Save Angles…

Save the angles in the angle table in a file.

Write to Device

The linearization parameters are written to the device. If the device is a dual die device then both die will have linearization enabled and the coefficients written

Save to File…

The linearization parameters are written to the device. If the device is a dual die device then two files will be generated with the name is the one selected with "_die1" or "_die2" appended to the filename.

Output Graph

Shows the binning curve.

Variable Point Linearization

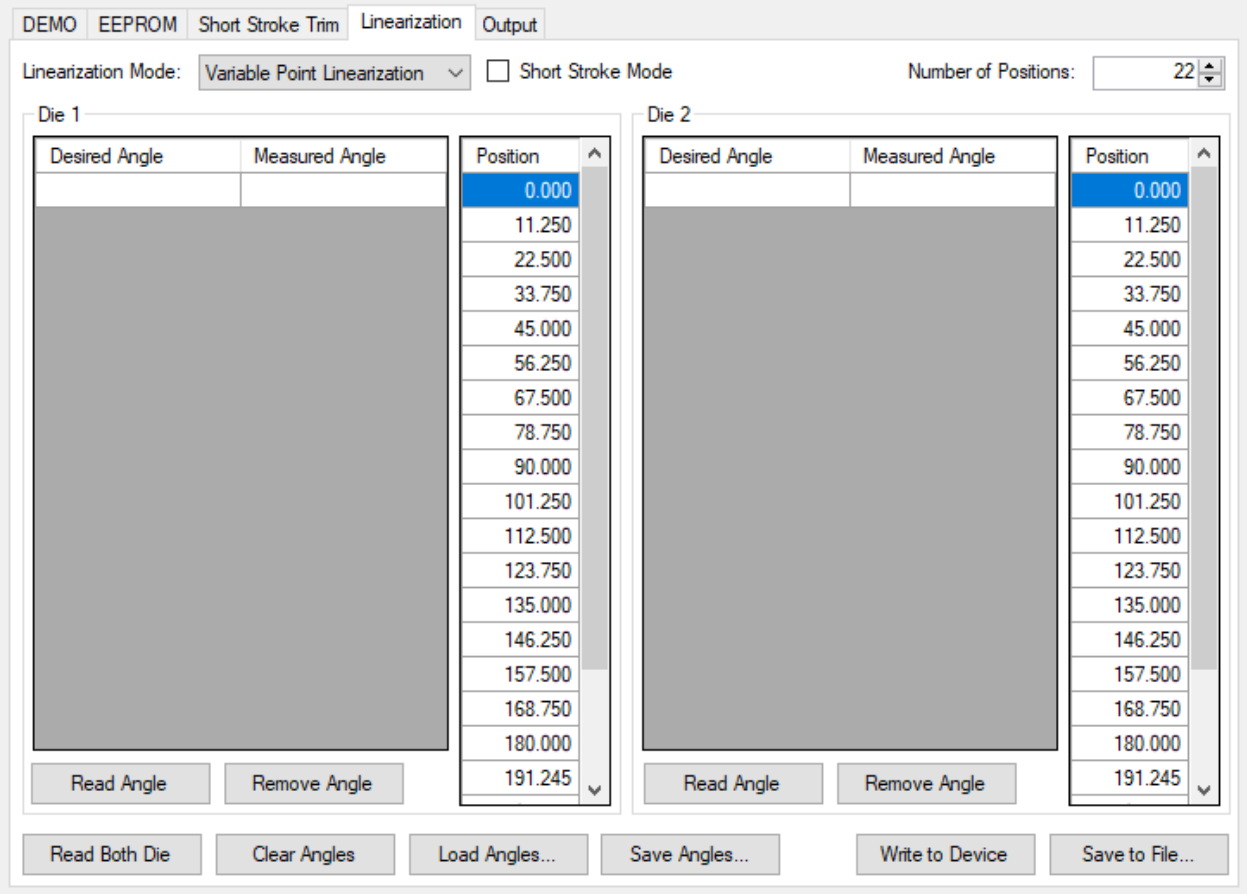


Figure 34: Linearization - Variable Point

To linearize the device, click on the **Linearization** tab

1. Enter the number of points that are to be collected in **Number of Input Angles.**
2. Select the number of positions (coefficients).
3. Fill in the right hand table. This table contains the locations of the coefficients.
4. The angle data needs to be entered into one of the left hand tables. To read the angle data in from a file:
    a. Click **Load Angles…** at the bottom of the angles table. A file browser dialog box will appear.
    b. Locate the file containing the angle data and select it. The **Desired Angle** and **Measured Angle** rows will be filled in.
5. If the angle data is to be read from the device:
    a. Fill in the **Desired Angle** for the first position, then move the magnet to the first position and click **Read Angle**.
    b. Move the magnet to the next locations. At each location, fill in the **Desired Angle** and then click **Read Angle**.

6. If the graph looks correct, click **Write to Device**. The programmer will write the linearization data to the device and then copy the linearization data to the EEPROM.

Reference

Number of Positions Numeric Text Box

Selects the number of positions (coefficients) that will be generated.

Input Angle Table

This is a table(s) of encoder values and read angles. The table for Die 2 is only writable when using a dual die device.

Position Table

This is a table(s) of where the coefficients will be positioned. The table for Die 2 is only writable when using a dual die device.

Read Angle

Read the angle from the A31315 and insert it into the table at the row that is selected and then moves the selection to the next row.

Remove Angle

Removes the row containing the selection from the table.

Read Both Die (Dual die device only)

Read the angles from both dies of the A31315 and insert them into the tables at the row that is selected and then moves the selection to the next row.

Load Angles…

Read in the angle input file (file format detailed later in this document).

Clear Angles

Clear the angles from the angle table and clear the harmonics table.

Save Angles…

Save the angles in the angle table in a file.

Write to Device

The linearization parameters are written to the device. If the device is a dual die device then both die will have linearization enabled and the coefficients written.

Save to File…

Saves the parameters needed to set the linearization mode that is defined on this tab. If the device is a dual die device then two files will be generated with the name is the one selected with "_die1" or "_die2" appended to the filename.

Variable Point Binning

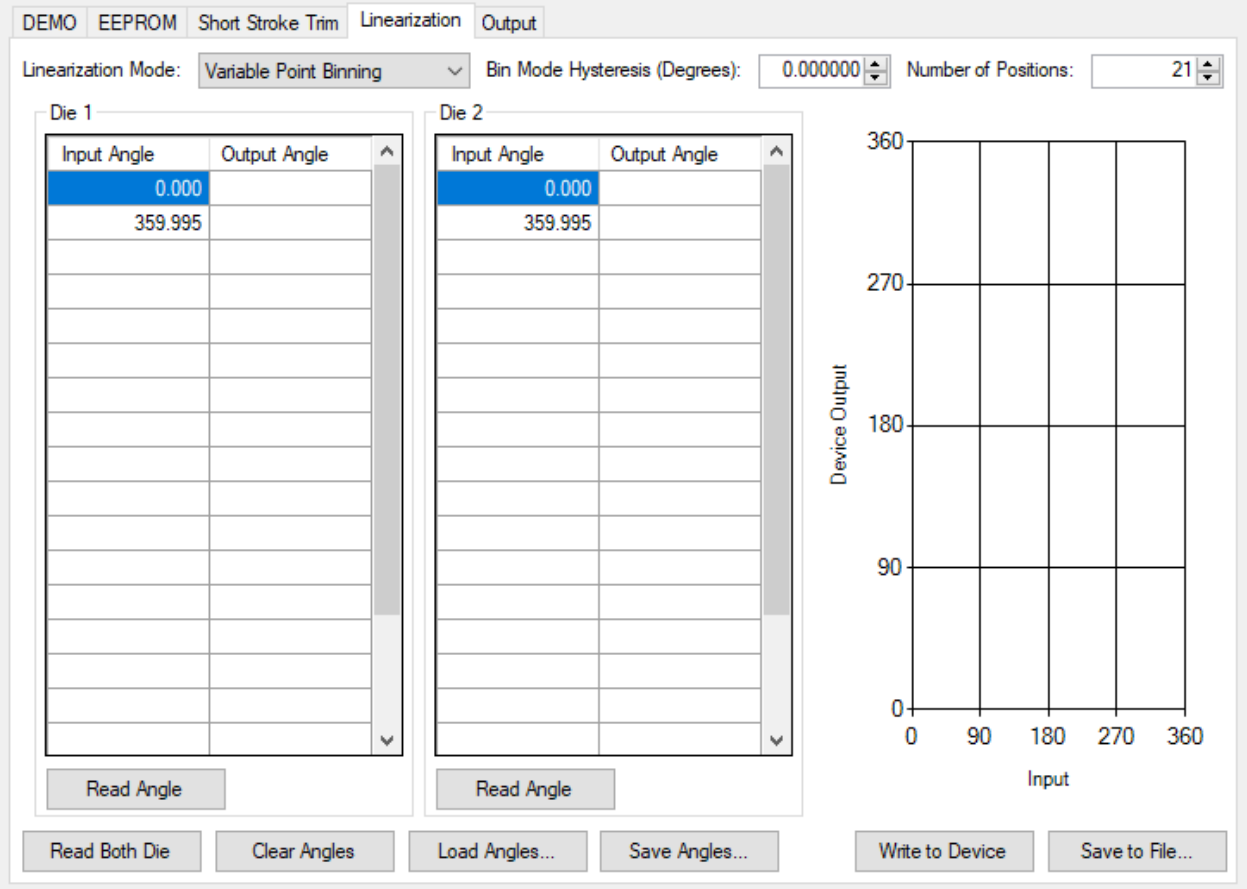


Figure 35: Binning - Variable Point

To linearize the device, click on the **Linearization** tab

1. Enter the number of bins in **Number of Positions.**
2. The angle data needs to be entered into one of the left hand tables. To read the angle data in from a file:
    a. Click **Load Angles…** at the bottom of the angles table. A file browser dialog box will appear.
    b. Locate the file containing the angle data and select it. The **Input Angle** and **Output Angle** rows will be filled in.
3. If the angle data is to be read from the device:
    a. Move the magnet to the first position and click **Read Angle** or if on a dual die device **Read Both Die**.
    b. Move the magnet to the next locations. At each location, click **Read Angle** or if on a dual die device **Read Both Die**.
4. If the graph looks correct, click **Write to Device**. The programmer will write the linearization data to the device and then copy the linearization data to the EEPROM.

Reference

Number of Positions Popup Menu
Selects the number of positions (coefficients) that will be generated.

Input Angle Table
This is a table of Input Angles which are fixed and read only and the output angles.

Bin Mode Hysteresis (Degrees): Numeric Text Box
Use this field to set the desired hysteresis for the input.

Read Angle
Read the angle from the A31315 and insert it into the table at the row that is selected and then moves the selection to the next row.

Load Angles…
Read in the angle input file (file format detailed later in this document).

Clear Angles
Clear the angles from the angle table and clear the harmonics table.

Save Angles…
Save the angles in the angle table in a file.

Write to Device
The linearization parameters are written to the device. If the device is a dual die device then both die will have linearization enabled and the coefficients written.

Save to File…
Saves the parameters needed to set the linearization mode that is defined on this tab. If the device is a dual die device then two files will be generated with the name is the one selected with "_die1" or "_die2" appended to the filename.

Output Graph
Shows the binning curve.

Output

Load from File… Button
Read the output parameters from a text or CSV input file.

Read from Device Button
The parameters are read from the device.

Write to Device Button

The output parameters are written to the device. If the device is a dual die device, then the parameters are written to both die.

Save to File… Button

Saves the parameters needed to set the output mode that is defined on this tab.

Analog Output

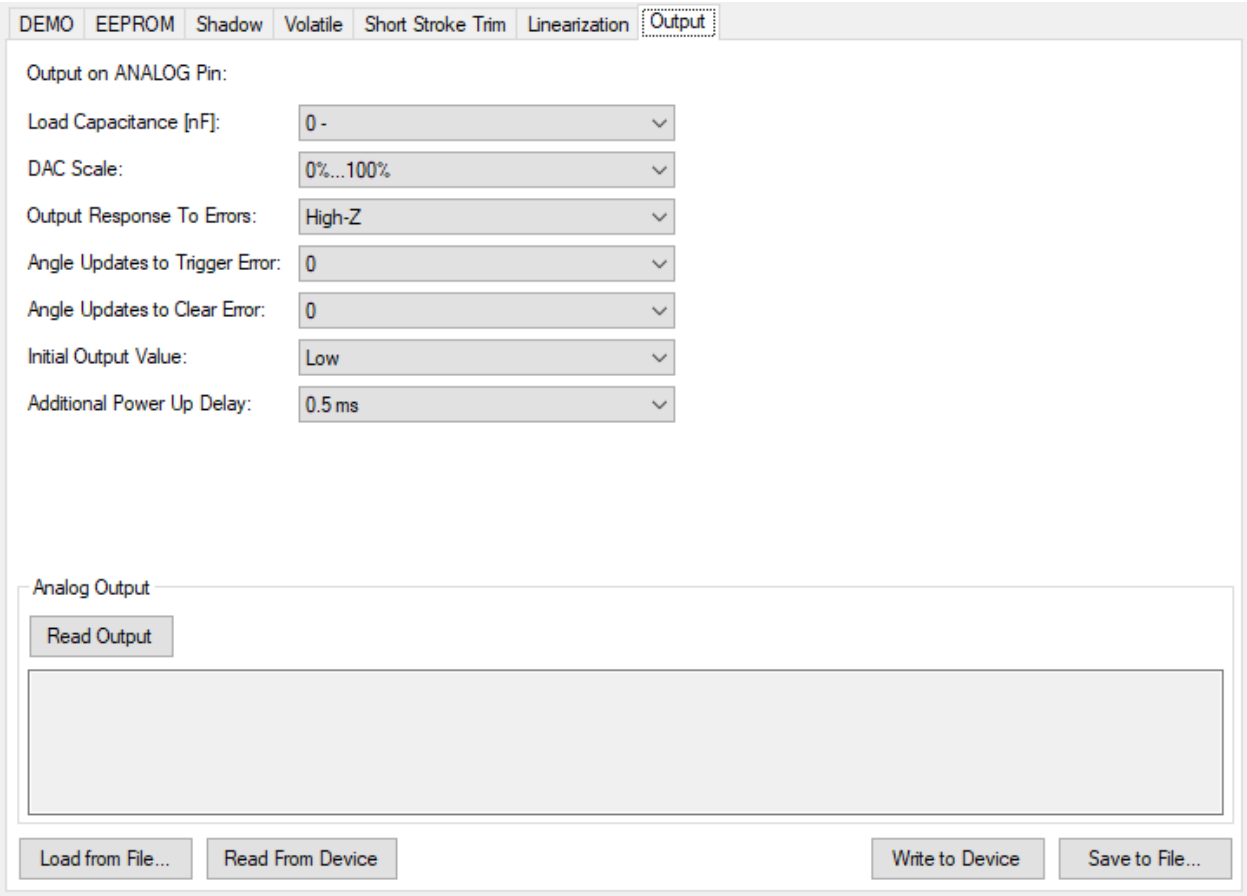


Figure 36: Output Tab, Analog

The A31315 can transmit sensor data using a voltage output being proportional to the measured angle on the output pin.

Load Capacitance [nF] Pull Down Menu

Sets the carrier frequency for the PWM output.

DAC Scale Pull Down Menu

This is how many times the sensor has to update before the error flags are cleared.

Output Response To Errors Pull Down Menu

Selects the driver used by the device. The choices are:

- Open Drain
- Push-Pull

Angle Updates to Trigger Error Pull Down Menu
The range is from 0, the shortest to 7 to the longest.

Angle Updates to Clear Error Pull Down Menu
The range is from 0, the shortest to 7 to the longest.

Initial Output Value Pull Down Menu
The range is from 0, the shortest to 7 to the longest.

Additional Power Up Delay Pull Down Menu
The range is from 0, the shortest to 7 to the longest.

Analog Output Text Box
Displays the read analog voltage.

Read Button
Reads the voltage from the Output pin.

PWM Output

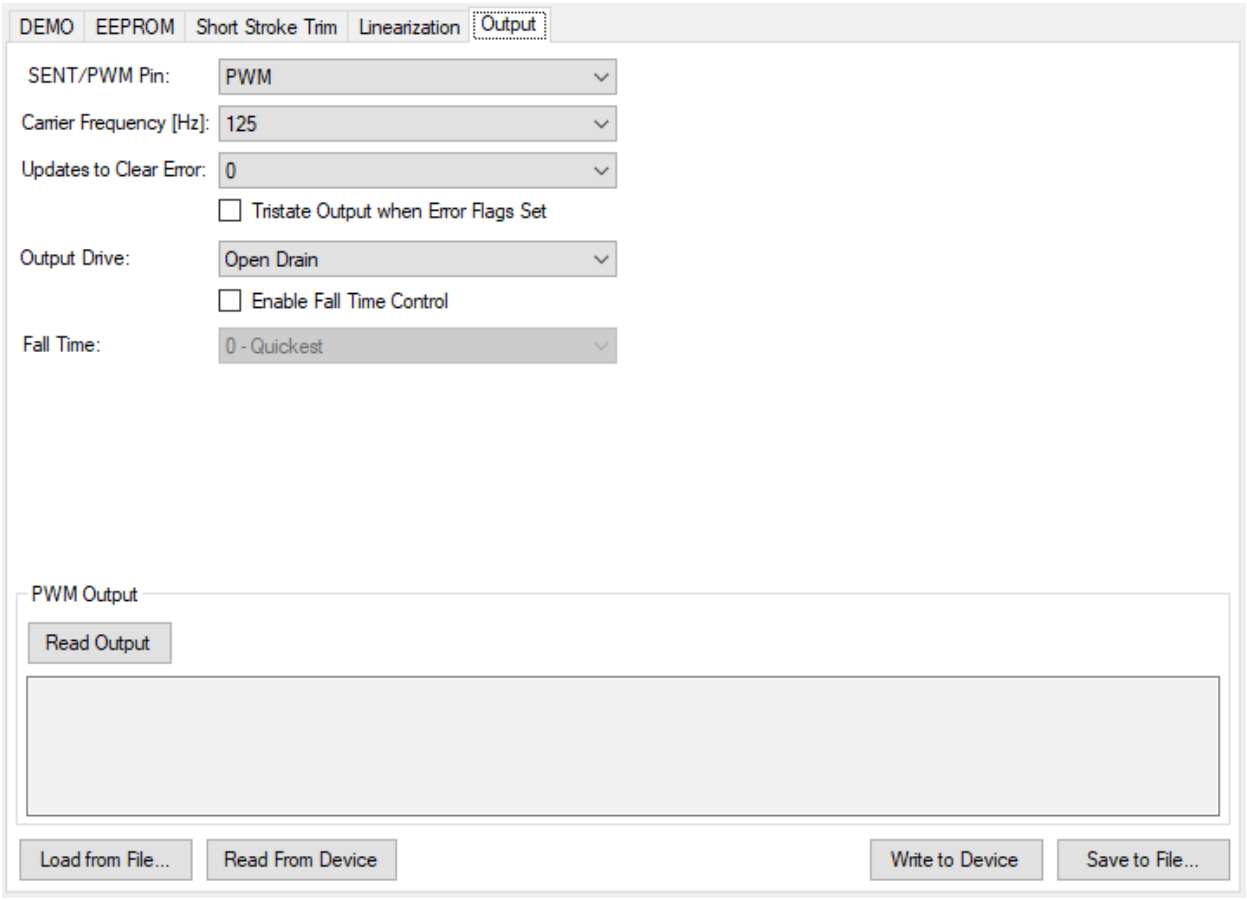


Figure 37: Output Tab, PWM

The A31315 can transmit sensor data using pulse-width-modulated output with duty cycle being proportional to the measured angle on the output pin. The PWM duty cycle ranges between 2% (corresponding to 0° angle) and 98% (corresponding to 360° angle).

Carrier Frequency [Hz] Pull Down Menu

Sets the carrier frequency for the PWM output.

Updates to Clear Error Pull Down Menu

This is how many times the sensor has to update before the error flags are cleared.

Tristate Output when Error Flags Set Check Box

When checked, the output will be disabled when the error flags are set.

Output Drive Pull Down Menu

Selects the driver used by the device. The choices are:

- Open Drain
- Push-Pull

Enable Fall Time Control Check Box

When checked, the fall time control is enabled.

Fall Time Pull Down Menu

The range is from 0, the shortest to 7 to the longest.

PWM Output Text Box

Displays the received PWM data.

Read Button

Reads the Duty Cycle and Frequency from the Output pin.

SENT Output

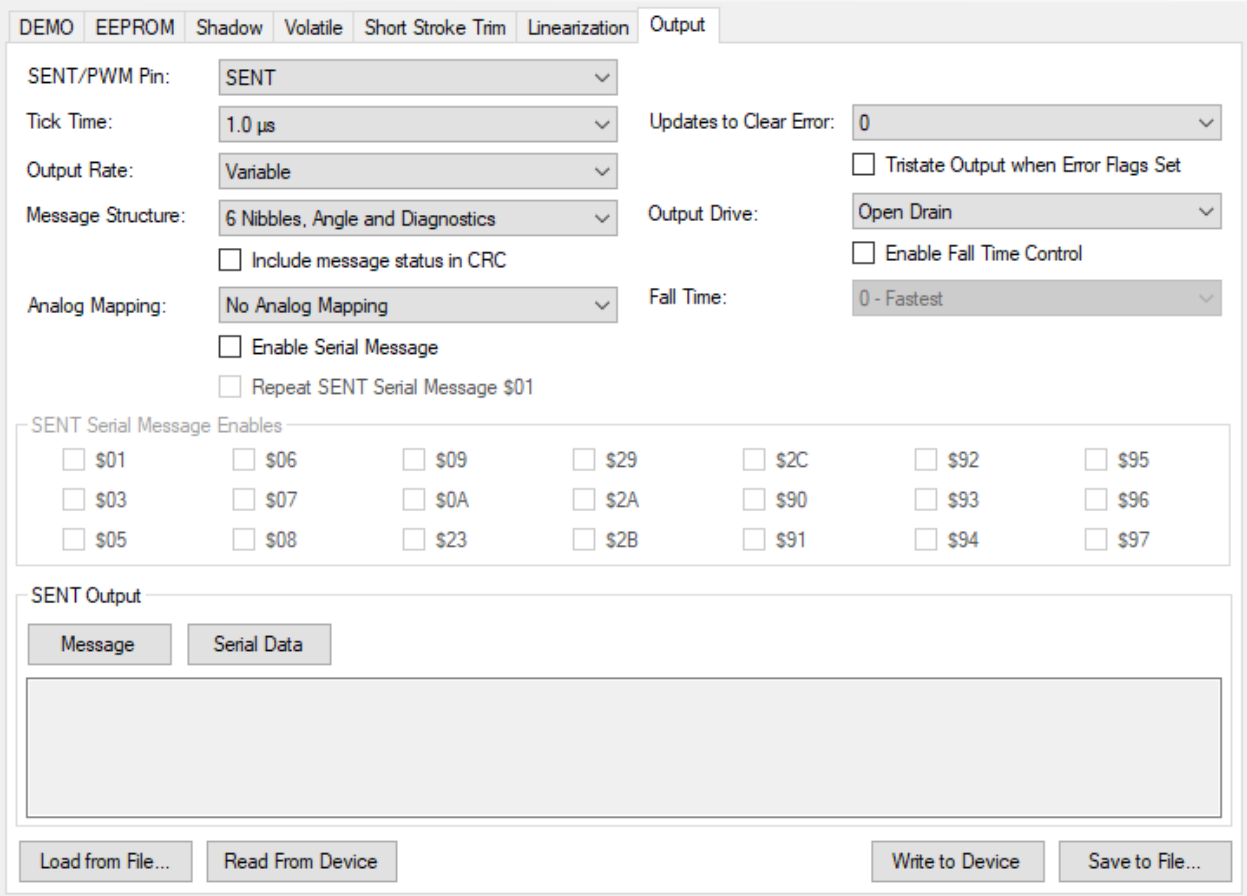


Figure 38: Output, SENT

Tick Time Pull Down Menu

Sets the length of one tick of the SENT Message tick.

Output Rate Pull Down Menu

This chooses from a variable output rate to one fixed by the tick time.

Message Structure Pull Down Menu

Selects the number of nibbles and what data is contained in the SENT Message

Include message status in CRC Check Box

When checked, the message status nibble will be included in the CRC calculations.

Analog Mapping Pull Down Menu

Selects if the data will be analog mapped and which initialization values to use.

Enable Serial Message Check Box

When checked, the message status nibble will contain the Slow Serial Message bits.

Repeat SENT Serial Message $01 Check Box

When checked, the slow serial message will interleave message $01 with the other selected messages.

SENT Serial Message Enables Check Box

When checked, the slow serial message will include the selected messages.

Updates to Clear Error Pull Down Menu

This is how many times the sensor has to update before the error flags are cleared.

Tristate Output when Error Flags Set Check Box

When checked, the output will be disabled when the error flags are set.

Output Drive Pull Down Menu

Selects the driver used by the device. The choices are:

- Open Drain
- Push-Pull

Enable Fall Time Control Check Box

When checked, the fall time control is enabled.

Fall Time Pull Down Menu

The range is from 0, the shortest to 7 to the longest.

SENT Output Text Box

Displays the received SENT data.

Message Button

Reads the SENT Message from the Output pin.

Serial Data Button

Reads the Serial Data from 18 or more SENT Messages from the Output pin.

File Formats

Memory

CSV or Comma Separated Value files use the file extension ".csv". Lines can be blank or if they start with a # then they are comments.

Each set of parameters will start with the group name. The only group name used for the A31315 is "EEPROM. The parameters are one per line with the name of the parameter, a comma, and then the value of the parameter.

Text files use the file extension ".txt" and are the same as csv files except instead of commas the parameter name and value are separated by an equal sign.

Example of CSV file

```
# this is a comment line
EEPROM,
qo_c,-246
sens_c,2
pol_c,0
out_msg_imm,0
dev_lock,0
```

Example of Text file

```
# this is a comment line
EEPROM
qo_c=-246
sens_c=2
pol_c=0
out_msg_imm=0
dev_lock=0
```

from the menu.

Angles

CSV or Comma Separated Value files use the file extension ".csv". Lines can be blank or if they start with a # then they are comments. If the comment is "# Die 1" then all following angle pairs will be inserted into the Die 1 table, if the comment is "# Die 2" then all of the following angle pairs will be inserted into the Die 2 table, if the linearization mode is variable linearization then if the comment is "# Position 1" then all of the following angles will be inserted into the Die 1 Position table and if the comment is "# Position 2" then all of the following angles will be inserted into the Die 2 Position table. If there are no comments, then the angles will be inserted into the table for the die selected by the die selection popup menu or if a single die device, then the die 1 table.

Example of CSV file

```
# Die 1
0, 0
36, 36.008
68, 57.508
100, 79.623
132, 103.370
164, 129.551
196, 159.258
228, 193.354
260, 232.894
292, 276.812
324, 323.586

# Die 2
324, 323.586
292, 276.812
260, 232.894
228, 193.354
196, 159.258
164, 129.551
132, 103.370
100, 79.623
68, 57.508
36, 36.008
0, 0
```

Scripting the Application

Scripting in C#

To create a script using C# that runs in the Allegro A31315 Samples programmer, use this template:

```
using System;
using Allegro.Script;

namespace ScriptTemplate
{
    public class ScriptTemplate: IScriptSource
    {
       public int ScriptType()
       {
              return 0;
       }

       public string ScriptName()
       {
              return "ScriptTemplate";
       }

       public string RunScript(IScriptPerformer performer)
       {

              return "This script does nothing";
       }
    }
```

```
}
```

The return value of the script type is not used at the present time so leave it alone. The script name should match the name of the file without the extension and can include spaces. RunScript is the method that will be executed when the script is run. The performer parameter is the scripts access to the application. The full C# language and all of the .net libraries are available for use in the scripting language.

IScriptPerformer Methods

SetScriptVariable

Set a string into the script variable dictionary with the given name.

```
void SetScriptVariable(string name, string value);
```

GetScriptVariable

Get a name string from the script variable dictionary. If the name is not in the dictionary a null is returned. The only predefined string is “scripting_path” which is how the script can set which file to be used instead of opening the file load or save dialogs and asking the user.

```
bool GetScriptVariable(string name, out string value);
```

SetScriptObject

Set an object into the script object dictionary with the given name.

```
void SetScriptObject(string name, object value);
```

GetScriptObject

Get a name object from the script object dictionary. If the name is not in the dictionary a null is returned. Currently the only predefined object is “ASEK” which is the ASEK programmer the application is currently using.

```
object GetScriptObject(string name);
```

Perform Action

This method performs the equivalent of a mouse click on an action keyword. There are action keywords for each of the buttons in the user interface.

```
bool PerformAction(string action);
```

PerformParameterAction

Perform parameter action will set or reset the select checkbox in the memory grid.

```
bool PerformParameterAction(string parameter, string action);
```

SetValue

Set the value of the given item.

```
bool SetValue(string target, string value);
```

SetParameterValue

Set the value of the given parameter.

```
bool SetParameterValue(string parameter, string parameterType, string value);
```

GetValue

Get the value of the given item.

```
string GetValue(string target);
```

GetDoubleValue

Get the value of the given item and try to convert it into a double.

```
double GetDoubleValue(string target);
```

GetIntegerValue

Get the value of the given item and try to convert it into an integer.

```
int GetIntegerValue(string target);
```

GetParameterValue

Gets the string value of the given parameter.

```
string GetParameterValue(string parameter, string parameterType);
```

GetDoubleParameterValue

Gets the double value of the given parameter.

```
double GetDoubleParameterValue(string parameter, string parameterType);
```

GetIntegerParameterValue

Gets the integer value of the given parameter.

```
int GetIntegerParameterValue(string parameter, string parameterType);
```

Example

```
using System;
using Allegro.ASEK;
using Allegro.Script;

namespace VerifyOperational
{
    public class VerifyOperational : IScriptSource
    {
            public int ScriptType()
            {
                  return 0;
            }

            public string ScriptName()
            {
                  return "VerifyOperational";
            }
```

```
        public string RunScript(IScriptPerformer performer)
    {
            ASEK asek = (ASEK)performer.GetScriptObject("ASEK");

            if (asek == null)
            {
                return "Communication not initialized.";
            }

            // Check to see if the ASEK is available to program with.
            if (!asek.IsActive())
            {
                return "Unable to verify the ASEK is connected and powered
on. Make sure it is connected and powered on.";
            }

            // Make sure the test starts in a known point, power off.
            if (!performer.PerformAction("PowerOff"))
            {
                return "Unable to perform the power off action. The ASEK is
not responding to commands. Could be a bad ASEK.";
            }

            // Make sure the voltage supply is really off
            if (performer.GetDoubleValue("Vcc") > 0.1)
            {
                return "Unable to verify that the supply voltage is off.
Could be a bad ASEK.";
            }

            // Power up the device.
            if (!performer.PerformAction("PowerOn"))
            {
                return "Unable to perform the power on action. Could be a
bad ASEK.";
            }

            // Make sure the supply is close to the desired voltage.
        double desiredVoltage = performer.GetDoubleValue("VoltageSupply");
            double voltageReading = performer.GetDoubleValue("Vcc");
            if ((voltageReading < (desiredVoltage - 0.1)) || (voltageReading >
(desiredVoltage + 0.1)))
            {
                return string.Format("The supply voltage is not close to
the desired voltage. Could be a bad ASEK. desired={0}, supply={1}", desiredVoltage,
voltageReading);
            }

            // Write to a scratch register to check to see if the device is
present and operational
            int readResults;
            Random randObj = new Random();
            int data = randObj.Next(0x0FFFFFF);
            try
            {

      ((IRegisterAccess)asek).WriteRegister(MemoryAccessType.primary, 0x01,
(uint)data);
            }
            catch
```

```
                    {
                        return "Error while writing to the A31315, verify that
there is an A31315 in the socket.\r\nIf there is one then it could be a bad A31315 or
a different device.";
                    }

                    // Read the scratch register
                    try
                    {
                readResults =
(int)((IRegisterAccess)asek).ReadRegister(MemoryAccessType.primary, 0x01);
                    }
                    catch
                    {
                        return "Error while reading from the device, could be a bad
A31315 or a different device.";
                    }

                    // Check to make sure the number that was written is the same as
what was read.
                    if (data != readResults)
                    {
                        return string.Format("Data read from the A31315 does not
match what was written, bad device. written={0}, read={1}", data, readResults);
                    }

            return "The set-up is operational.";
        }
    }
}
```

Scripting in Visual Basic

To create a script using Visual Basic that runs in the Allegro A31315 Samples programmer, use this template:

```
Imports System
Imports Allegro.Script

Public Class ScriptTemplate
       Implements IScriptSource

       Public Function ScriptType() As Integer Implements IScriptSource.ScriptType
              Return 0
       End Function

       Public Function ScriptName() As String Implements IScriptSource.ScriptName
              Return " ScriptTemplate "
       End Function

       Public Function RunScript(performer As IScriptPerformer ) As String Implements
IScriptSource.RunScript
              Return "The script is done."
       End Function
End Class
```

The return value of the script type is not used at the present time so leave it alone. The script name should match the name of the file without the extension and can include spaces. Run script is the method that will be executed when the script is run. The performer parameter is the scripts access to

the application. The full visual basic language and all of the .net libraries are available for use in the scripting language.

IScriptPerformer Methods

SetScriptVariable

Set a string into the script variable dictionary with the given name.

```
void SetScriptVariable(string name, string value);
```

GetScriptVariable

Get a name string from the script variable dictionary. If the name is not in the dictionary a null is returned. The only predefined string is “scripting_path” which is how the script can set which file to be used instead of opening the file load or save dialogs and asking the user.

```
bool GetScriptVariable(string name, out string value);
```

SetScriptObject

Set an object into the script object dictionary with the given name.

```
void SetScriptObject(string name, object value);
```

GetScriptObject

Get a name object from the script object dictionary. If the name is not in the dictionary a null is returned. Currently the only predefined object is “ASEK” which is the ASEK programmer the application is currently using.

```
object GetScriptObject(string name);
```

Perform Action

This method performs the equivalent of a mouse click on an action keyword. There are action keywords for each of the buttons in the user interface.

```
bool PerformAction(string action);
```

PerformParameterAction

Perform parameter action will set or reset the select checkbox in the memory grid.

```
bool PerformParameterAction(string parameter, string action);
```

SetValue

Set the value of the given item.

```
bool SetValue(string target, string value);
```

SetParameterValue

Set the value of the given parameter.

```
bool SetParameterValue(string parameter, string parameterType, string value);
```

GetValue

Get the value of the given item.

```
string GetValue(string target);
```

GetDoubleValue

Get the value of the given item and try to convert it into a double.

```
double GetDoubleValue(string target);
```

GetIntegerValue

Get the value of the given item and try to convert it into an integer.

```
int GetIntegerValue(string target);
```

GetParameterValue

Gets the string value of the given parameter.

```
string GetParameterValue(string parameter, string parameterType);
```

GetDoubleParameterValue

Gets the double value of the given parameter.

```
double GetDoubleParameterValue(string parameter, string parameterType);
```

GetIntegerParameterValue

Gets the integer value of the given parameter.

```
int GetIntegerParameterValue(string parameter, string parameterType);
```

Example

```
Imports System
Imports Allegro.ASEK
Imports Allegro.Script

Public Class VerifyOperational
    Implements IScriptSource

    Public Function ScriptType() As Integer Implements IScriptSource.ScriptType
        Return 0
    End Function

    Public Function ScriptName() As String Implements IScriptSource.ScriptName
        Return "VerifyOperational"
    End Function

    Public Function RunScript(performer As IScriptPerformer) As String Implements
IScriptSource.RunScript
        Dim asek As ASEK = DirectCast(performer.GetScriptObject("ASEK"), ASEK)
        Dim reg As IRegisterAccess = DirectCast(performer.GetScriptObject("ASEK"),
IRegisterAccess)

        If asek = null Then
```

```
            Return "Communication not initialized."
        End If

        ' Check to see if the ASEK05 is available to program with.
        If asek.IsActive() = False Then
            Return "Unable to verify the ASEK is connected and powered on. Make sure it
is on the local network, connected it and powered on."
        End If

        ' Make sure the test starts in a known point, power off.
        If performer.PerformAction("PowerOff") = False Then

            Return "Unable to perform the power off action. The ASEK is not responding to
commands. Could be a bad ASEK."
        End If

        ' Make sure the voltage supply is really off
        If performer.GetDoubleValue("voltage_supply_reading") > 0.1 Then
            Return "Unable to verify that the supply voltage is off. Could be a bad
ASEK."
        End If

        ' Power up the device.
        If performer.PerformAction("PowerOn") = False Then
            Return "Unable to perform the power on action. Could be a bad ASEK."
        End If

        ' Make sure the supply is close to the desired voltage.
        Dim desiredVoltage As Double = performer.GetDoubleValue("VoltageSupply")
        Dim voltageReading As Double = performer.GetDoubleValue("Vcc")
        If ((voltageReading < (desiredVoltage - 0.1)) Or (voltageReading >
(desiredVoltage + 0.1))) Then
            Return String.Format("The supply voltage is not close to the desired voltage.
Could be a bad ASEK. desired={0}, supply={1}", desiredVoltage, voltageReading)
        End If

        ' Write to a scratch register to check to see if the device is present and
operational
        Dim readResults As UInteger
        Dim address As UInteger = 4
        Dim randObj As Random = New Random()
        Dim data As UInteger = randObj.Next(&HFFF)
        Try
            reg.WriteRegister(MemoryAccessType.primary, 1, data)
        Catch ex As Exception
            Return "Error while writing to the A31315, verify that there is an A31315 in
the socket.\r\nIf there is one then it could be a bad A31315 or a different device."
        End Try

        ' Read the scratch register
        Try
            readResults = reg.ReadRegister(MemoryAccessType.primary, 1)
        Catch ex As Exception
            Return "Error while reading from the device, could be a bad A31315 or a
different device."
        End Try
```

```
        ' Check to make sure the number that was written is the same as what was read.
        If data <> readResults Then
            Return String.Format("Data read from the A31315 does not match what was
written, bad device. written={0}, read={1}", data, readResults)
        End If

        Return "The set-up is operational."
    End Function
End Class
```

Keywords

Action Keywords

LoadMemoryFile

Load the memory grid from a file. If the script variable “scripting_path” is set, it is used instead of opening up a file browser and asking the user where the file is.

SaveMemoryFile

Save the selected parameters in the memory grid to a file. If the script variable “scripting_path” is set, it is used instead of opening up a file browser and asking the user where the file is.

PowerOn

Set the voltage supplied to the device to the value contained in VoltageSupply then turn the supply on.

PowerOff

Turn the power off for the device.

SelectAllEEPROM

Selects all the parameters. Note: It will select both the memory locations and the fields.

DeselectAllEEPROM

Deselects all the parameters.

ZeroSelectedEEPROM

Replaces the values associated with the selected parameters with zeros.

ClearSelectedEEPROM

Removes the values associated with the selected parameters.

ReadSelectedEEPROM

Reads all the selected parameters to the A31315.

WriteSelectedEEPROM

Writes all the selected parameters to the A31315. They can be a mix of memory locations and fields.

VerifySelectedEEPROM
Reads the selected parameters from the A31315 and makes sure they are the same as what is displayed in the Memory table.

LoadEEPROMFile
Load the fields and/or memory locations from a text or csv file and select the fields and memory locations that were loaded. If the scripting variable “scripting_path” is set, this path will be used instead of opening a file browser and asking the user for the file.

SaveEEPROMFile
Save the selected fields and/or memory locations to a text or csv. If the scripting variable “scripting_path” is set, this path will be used instead of opening a file browser and asking the user for the file.

SelectAllShadow
Selects all the parameters. Note: It will select both the memory locations and the fields.

DeselectAllShadow
Deselects all the parameters.

ZeroSelectedShadow
Replaces the values associated with the selected parameters with zeros.

ClearSelectedShadow
Removes the values associated with the selected parameters.

ReadSelectedShadow
Reads all the selected parameters to the A31315.

WriteSelectedShadow
Writes all the selected parameters to the A31315. They can be a mix of memory locations and fields.

VerifySelectedShadow
Reads the selected parameters from the A31315 and makes sure they are the same as what is displayed in the Memory table.

SelectAllVolatile
Selects all the parameters. Note: It will select both the memory locations and the fields.

DeselectAllVolatile
Deselects all the parameters.

ZeroSelectedVolatile
Replaces the values associated with the selected parameters with zeros.

ClearSelectedVolatile
Removes the values associated with the selected parameters.

ReadSelectedVolatile
Reads all the selected parameters to the A31315.

WriteSelectedVolatile
Writes all the selected parameters to the A31315. They can be a mix of memory locations and fields.

VerifySelectedVolatile
Reads the selected parameters from the A31315 and makes sure they are the same as what is displayed in the Memory table.

Value Keywords

VoltageSupply
This is the desired voltage supply in volts. It will be used when the power is turned on.

Vcc
Vcc is the voltage that is currently being supplied to the device in volts. (Read Only)

Icc
Icc is the current that is currently being supplied to the device in milliamps. (Read Only)

ShowVolatileViewAs
Selects if the fields or memory locations will be displayed. Possible values are “All Memory Locations” and “All Fields”.

ShowEEPROMViewAs
Selects if the fields or memory locations will be displayed. Possible values are “All Memory Locations”, “All Fields”, “Short Stroke Fields”, “Linearization Fields”.

ShowShadowViewAs
Selects if the fields or memory locations will be displayed. Possible values are “All Memory Locations” and “All Fields”.

EnableTPPDiagnostics
Enable the Two Point Programming Diagnostics.

TPPDiagnosticsFile
The value is the path and name of the file the Two Point Programming Diagnostics file will be saved in.

Selected
Returns the number of parameters selected in the memory grid.

Parameters

The parameters are identified by the parameter name, a @ then the group name. For example, to specify the pwm mode field in the EEPROM the string would be “PWM_MODE@ EEPROM”

EEPROM

eeprom_5
be_miller_en
channel_hyst_c_a
channel_hyst_c_b
dig_opendr_e
init_ana_out
burn_in_test_en
eeprom_16
pre_sat_en
pre_sat_lo
pre_sat_hi
eeprom_17
offs_c_a
pol_c_a
eeprom_18
offstc1_cld_c_a
offstc1_hot_c_a
eeprom_19
sens_c_a
eeprom_1a
senstc1_cld_c_a
senstc1_hot_c_a
eeprom_1b
senstc2_cld_c_a
senstc2_hot_c_a
eeprom_1c
offs_c_b
pol_c_b
eeprom_1d
offstc1_cld_c_b
offstc1_hot_c_b
eeprom_1e
sens_c_b
eeprom_1f
senstc1_cld_c_b
senstc1_hot_c_b
eeprom_20
senstc2_cld_c_b
senstc2_hot_c_b
toff_c
eeprom_21
lin_enable
lin_mode
lin_coeff_scalar
lin_coeff_active
ee_cust_spares_1
lin_coeff_00
eeprom_22
lin_coeff_01
lin_coeff_02
eeprom_23
lin_coeff_03
lin_coeff_04
eeprom_24
lin_coeff_05
lin_coeff_06
eeprom_25
lin_coeff_07
lin_coeff_08
eeprom_26
lin_coeff_09
lin_coeff_10
eeprom_27
lin_coeff_11
lin_coeff_12
eeprom_28
lin_coeff_13
lin_coeff_14
eeprom_29
lin_coeff_15
lin_coeff_16
eeprom_2a
lin_coeff_17
lin_coeff_18
eeprom_2b
lin_coeff_19
lin_coeff_20
eeprom_2c
lin_coeff_21
lin_coeff_22
eeprom_2d
lin_coeff_23
lin_coeff_24
eeprom_2e
lin_coeff_25
lin_coeff_26
eeprom_2f
lin_coeff_27
lin_coeff_28
eeprom_30
lin_coeff_29
lin_coeff_30
eeprom_31
lin_coeff_31
lin_coeff_32
eeprom_32
cordic_pol
cordic_chan_sel
byp_cordic
pre_gain_offset
eeprom_33
angle_gain
bin_hyst
eeprom_34
post_gain_offset_s
at
post_gain_offset
post_gain_sat
post_gain_sat_val
eeprom_35
mag_thresh_min_e
n
mag_thresh_min
mag_thresh_max_e
n
mag_thresh_max
eeprom_36
lower_clamp
eeprom_37
upper_clamp
bw_sel_filter
bw_adap_min
bw_adap_max
eeprom_38
gain_frac
gain_exp
dly_fall
por_iir_byp_config
eeprom_39
digital_output_mod
e
device_id
sent_data_cfg
sent_ticks_clk_num
_pwm_period
sent_drive
sent_ftc_e_n
sent_no_msg
scn_crc_en
sent_data_analog_
map
sent_init_code_ana
log_map
eeprom_3a
sent_emsg_enable
sent_emsg_1_repe
at
eeprom_3b
acf_mask
aoc_mask
tse_mask
sat_mask
ofe_mask
slf_mask
srr_mask
por_mask
ese_mask
spe_mask
uvcc_mask
ovcc_mask
fault_filt
vcf_fault_filt
sat_lin_mask
sat_cor_mask

ee_cust_spares_2
make_factory_writable_c
eeprom_3c
sdata_i_lo_thr
sdata_i_hi_thr
analog_lock
err_min
out_err_resp_conf
dig_out_err_resp_conf
be_bw_sel
be_scale
ee_cust_spares_0
vcc_uv_thresh
vcc_ov_thresh
block_volatile_output
manch_trigger_dis
mem_lock
unlock_code

shadow

shadow_5
be_miller_en
channel_hyst_c_a
channel_hyst_c_b
dig_opendr_e
init_ana_out
burn_in_test_en
shadow_16
pre_sat_en
pre_sat_lo
pre_sat_hi
shadow_17
offs_c_a
pol_c_a
shadow_18
offstc1_cld_c_a
offstc1_hot_c_a
shadow_19
sens_c_a
shadow_1a
senstc1_cld_c_a
senstc1_hot_c_a
shadow_1b
senstc2_cld_c_a
senstc2_hot_c_a
shadow_1c
offs_c_b
pol_c_b
shadow_1d
offstc1_cld_c_b
offstc1_hot_c_b
shadow_1e
sens_c_b
shadow_1f
senstc1_cld_c_b
senstc1_hot_c_b
shadow_20
senstc2_cld_c_b
senstc2_hot_c_b
toff_c
shadow_21
lin_enable
lin_mode
lin_coeff_scalar
lin_coeff_active
ee_cust_spares_1
lin_coeff_00
shadow_22
lin_coeff_01
lin_coeff_02
shadow_23
lin_coeff_03
lin_coeff_04
shadow_24
lin_coeff_05
lin_coeff_06
shadow_25
lin_coeff_07
lin_coeff_08
shadow_26
lin_coeff_09
lin_coeff_10
shadow_27
lin_coeff_11
lin_coeff_12
shadow_28
lin_coeff_13
lin_coeff_14
shadow_29
lin_coeff_15
lin_coeff_16
shadow_2a
lin_coeff_17
lin_coeff_18
shadow_2b
lin_coeff_19
lin_coeff_20
shadow_2c
lin_coeff_21
lin_coeff_22
shadow_2d
lin_coeff_23
lin_coeff_24
shadow_2e
lin_coeff_25
lin_coeff_26
shadow_2f
lin_coeff_27
lin_coeff_28
shadow_30
lin_coeff_29
lin_coeff_30
shadow_31
lin_coeff_31
lin_coeff_32
shadow_32
cordic_pol
cordic_chan_sel
byp_cordic
pre_gain_offset
shadow_33
angle_gain
bin_hyst
shadow_34
post_gain_offset_sat
post_gain_offset
post_gain_sat
post_gain_sat_val
shadow_35
mag_thresh_min_en
mag_thresh_min
mag_thresh_max_en
mag_thresh_max
shadow_36
lower_clamp
shadow_37
upper_clamp
bw_sel_filter
bw_adap_min
bw_adap_max
shadow_38
gain_frac
gain_exp
dly_fall
por_iir_byp_config
shadow_39
digital_output_mode
device_id
sent_data_cfg
sent_ticks_clk_num_pwm_period
sent_drive
sent_ftc_e_n
sent_no_msg
scn_crc_en
sent_data_analog_map
sent_init_code_analog_map
shadow_3A
sent_emsg_enable
sent_emsg_1_repeat
shadow_3b
acf_mask
aoc_mask
tse_mask
sat_mask
ofe_mask
slf_mask

srr_mask
por_mask
ese_mask
spe_mask
uvcc_mask
ovcc_mask
fault_filt
vcf_fault_filt

volatile

ee_marg_tst
margin_start
margin_no_max
margin_no_min
margin_status
margin_min_max_fail
ee_use_test_addr
ee_test_addr
ee_loop
test
bist_done
lbist_pass1_fail0
access
customer_access
customer_eeprom_lock_wr
customer_eeprom_lock_rd
customer_register_lock_wr
customer_register_lock_rd
access_key
sat_lin_mask
sat_cor_mask
ee_cust_spares_2
make_factory_writable_c
shadow_3c
sdata_i_lo_thr
sdata_i_hi_thr
status
rdy
ardy
crdy
spe_addr
vc_vcc_uv
vc_vcc_ov
vc_vcc_hv
sat_cor
sat_lin
sat_filt
vcf
hall_hdrm_chan_a_fault
hall_hdrm_chan_b_fault
ov_flag_pre
ov_flag_off
ov_flag_gain
diag_clk_cnt
cust_vol_0
lbist_cust_trigger
manch_comm_e
calc_lbist_sign
lbist_calc_misr_final
analog_lock
err_min
out_err_resp_conf
dig_out_err_resp_conf
be_bw_sel
be_scale
ee_cust_spares_0
ctrl
srst
error
acf
aoc
tse
sat
slf
srr
por
ese
uvcc
ovcc
eue
spe
ofe
emsg_error
acf_emsg
aoc_emsg
tse_emsg
sat_emsg
slf_emsg
srr_emsg
por_emsg
ese_emsg
uvcc_emsg
vcc_uv_thresh
vcc_ov_thresh
block_volatile_output
manch_trigger_dis
mem_lock
unlock_code

ovcc_emsg
diag_error
acf_diag
aoc_diag
tse_diag
sat_diag
slf_diag
srr_diag
por_diag
ese_diag
uvcc_diag
ovcc_diag
snap_err
snapshot_err
angle
angle_out_16b
temp_out_16b
chan_a
fe_channel_a
fe_channel_b
mag_a_b
mag_out_a_c
mag_out_b_c
rad_sq
radius_out_sq