User Manual



Using Allegro ASEK37601 Daughterboard with ACS37601 Samples Programmer GUI

Introduction

This quick guide documents the use of the ASEK37601 daughterboard (TED-0003717) and ASEK-20 (Part #850540-004) with the Allegro ACS37601 Samples Programmer. ASEK37601 daughterboard layout and 3D view can be seen in Figure 1 and 2. See the Appendix section for the ASEK37601 Daughterboard Schematic.



Figure 1: ASEK37601 Top and Bottom Layers



Figure 2: ASEK37601 3D view

Downloading the Programmer GUI

- 1. Register for software on the Allegro Software Portal: https://registration.allegromicro.com/login.
- Ensure that the ASEK-20 being used has the most recent firmware downloaded. Refer to the ASEK-20 firmware webpage (https://registration.allegromicro.com/parts/ ASEK-20#/parts/ASEK-20) and the ASEK-20 quick guide under "Support Files" on the ASEK-20 firmware webpage.
- 3. After registering and logging in to the software portal, the dashboard page will be shown. Choose the "Find a Part" button.
- 4. Search for "ACS37601" in the "Select by Part Number" search bar shown in Figure 3.

4	ALLE	GRO	MY DASHBOARD	TECHNICAL SUPPORT	FIND A PART	
	Availal	ble Parts				
	Part Listir	ng				
	Select by Part N	lumber				
	37601					
	Part Num	bers				
	Part No.	Category	Subcat	egory		
	ACS37601	Current Sensor ICs	Field Se	ensors 0 To >1000 A Sensor IC	S	VIEW

Figure 3

- 5. Click "View" next to the ACS37601 search result.
- Click "Download" to save the Programming Application ZIP file.

Windows	Programming Application	Allegro ACS37601 Samples Programmer v1.0.0.zip	DOWNLOAD
	Fig	ure 4	

- 7. Extract downloaded ZIP file to a known location.
- 8. Go to the extracted folder and launch "Allegro ACS37601 Samples Programmer.exe" application file.

Connecting ASEK-20 to PC and ASEK37601 Daughterboard

- 1. Interconnect PC and USB port on the ASEK-20 chassis with provided cable.
- 2. Connect ribbon cable to the J2 connector on the left-hand side of the ASEK37601 daughterboard.
- 3. Connect the other end of the ribbon cable to the "Device Connection" port on the ASEK-20 chassis as shown in Figure 5.



Figure 5: Connection between ASEK-20 and ASEK37601

- 4. Connect the 5 V DC Power Supply.
- 5. Power-up ASEK-20: Move "Off-On" switch to ON position.

Inserting ACS37601 into the Socket

To insert ACS37601 into the daughterboard, do the following:

- 1. Place the ACS37601 into the J1 socket with pin1 as indicated on Figure 6.
- 2. Ensure that the ejector pin mark is on the side facing down into the socket.
- 3. Secure the part in place using the clamps on the left and right side of the socket.



Figure 6: ACS37601 in KT socket

)	Number	Name	Function
	1	VCC	Device power supply terminal
	2	VOUT	Analog output signal, also used for programming
1111	3	FAULT	Overcurrent fault and overtemperature fault
	4	GND	Device ground terminal
.n.n			

Figure 7: Pinout Diagram (Ejector pin mark on opposite side)

Using Programmer GUI

Opening the programmer will result in a window identical to Figure 8 below.

ie cont setup scripts neip										
wo Point Trim	Memory								Power	
esired VOUT Voltage t colibration current [V] 3.0 \$	EEPRON Show	Shadow Volatile All Fields	~	Search Name and Descri	ption		ρ		Voltage Supply [V]	5.000 Power On
esired VOUT Voltage	Select	Name	Code	Value		Units	^	Read Selected		
t zero current [V] 2.50 😨		diag_vref_dis							Vec [V]	
		disg_iref_dis			v			Write Selected	loc (mA)	
Anothe Boots durated	님	diag_osc_dis			~					
and press the button below		diag_vcc_dia						Zero Selected		
Annhy Zaro Current	HH	diag_vinon_ois			-				Output	
reply core content	- T	ding theil dis						Clear Selected	VOUT Voltage [V]	
		dieg_temp_dis							Read Outr	
		diag_fe_dis						Select All	1000 004	
		diag_be_off_dis								
		diag_be_stuck_dis						Deselect All		
		disg_be_nocheck_dis								
		diag_ocf_comp_dis								
	님	diag_otf_dis								
		diag_abist_dis			~		~			
Adjust Zero Current								Lood		
								Save		

Figure 8: ACS37601 Programmer Application

To configure ASEK-20 Communication Port, go to menu "Setup \rightarrow Communication Setup" (or double click the 'COM' indicator at bottom-right corner).



🦪 Communica	ation Setu	p			Х
COM Port: Status	COM4 COM3 COM4		~	Refresh	
Communica	tion: Act	live			
Version:	15	1.9.3.0			
Enable Lo	gging	OK		Cancel	

Figure 9: Communication Setup dialog box

The dialog box in Figure 9 will appear. If the COM port is unknown, do the following:

- 1. Unplug the USB cable to the ASEK-20.
- 2. Click "Refresh" in the "Communication Setup" dialog window.
- 3. Click on the "COM Port" pulldown menu.
- 4. Note which ports are in the menu.
- 5. Plug the USB cable back into the ASEK-20.
- 6. Click "Refresh".
- 7. Click the "COM Port" popup menu again.
- 8. Note the COM port not previously listed in the menu; this is the port connected to the ASEK-20.
- 9. Select this COM port to use.

Once the correct COM port is selected and the ASEK-20 is connected to the PC, verify next to "Communication" the status of the ASEK-20.

If the status is "Active", the ASEK-20 is powered and responding. If the status is "Inactive", the ASEK-20 is not responding or powered on. If this is the case, click "Refresh" and ensure the ASEK-20 chassis is plugged into the PC and the chassis is powered on.

Click "OK" to exit the dialog box.

Status Bar

The green or red colored rectangle on the right side of the status bar shown highlighted in red in Figure 10 indicates the status of the communication with the ASEK. If the status bar is red, the communication is not active and if green, the application is communicating with the ASEK. Clicking on the rectangle will open the Communication setup dialog window.

Load		
Save	Version 1.1.0	
	COM4	

Figure 10: Status bar on the bottom right-hand side of GUI

Turning the Part ON and OFF

To power on the part using the ASEK-20, click "Power On" on the right-hand side of the programmer GUI as show in Figure 11.

Power	
Voltage Supply [V]	5.000 🚔
Power Off	Power On
Vcc [V]	4.970
lcc [mA]	12.802
Output VOUT Voltage [V]	2.493
Read Ou	ıtput

Figure 11: "Power On/Off" and "Read Output"

Once the part is powered on, values for " V_{CC} " and " I_{CC} " will populate with the measured values. Verify that the voltage is what is desired and that the device is consuming typically 13 mA (maximum of 19 mA).

To read the output of the ACS37601, click "Read Output" button in Figure 11. Verify the Output Voltage is a reasonable number, around 2.5 V with zero external field applied if testing a bidirectional part with 5 V typical V_{CC} (0.5 V with zero external field applied for a unidirectional device).

To turn the part off, click "Power Off" button.



Read and Writing to the Part

Note before reading and writing to the part, the part must be connected and powered on using the programmer GUI.

It is recommended that the user save the memory to a tabular file before experimenting with programming so the user can return the device to its original factory programmed state if necessary. See the Saving and Loading Memory Files section below.

To read a field, select the desired field by checking the box under "Select" to the left of the register name and click the "Read Selected" button from Figure 12.

To write to a field, select the desired field by checking the box under "Select" to the left of the name. Change the value under "Code" to the desired value and press Enter. Click "Write Selected" button from Figure 12.

To verify that field was written to the device, do the following: click "Clear Selected" causing the values in the "Code" and "Value" cells to disappear. Then click "Read Selected". The values that were written will reappear in the "Code" and "Value" cells verifying the user correctly wrote to the part.

Select	Name	Code	Value	Units	^	Read Selected
\checkmark	diag_fault_consistency_dis	1	true ~			neda beletica
\checkmark	vout_safe_state_sel	0	false ~			Write Selected
\checkmark	uvd_dis	0	false 🗸			White Selected
\checkmark	ovd_dis	0	false 🗸			Zore Colocted
\checkmark	clamp_dis	0	false 🗸			Zero Selecteu
	bw_sel	0	240	kHz		
\checkmark	otf_dis	0	false 🗸			Clear Selected
\checkmark	otf_latch	0	false 🗸			
\checkmark	otf_thresh	0	100	°C		Select All
\checkmark	diag_int_err_latch	0	false 🗸			
\checkmark	diag_vout_latch	0	false 🗸			Deselect All
\checkmark	diag_fe_latch	0	false 🗸			
\checkmark	qvo_fine	0	0			
\checkmark	sens_fine	0	0		v	

Figure 12: "Read Selected" and "Write Selected" buttons

Below, each option on the programmer menu has been briefly defined:

- Read Selected: Reads value of the selected field.
- Write Selected: Writes entered value to the part.
- Zero Selected: This option will zero the selected field but will not write zero to the device unless "Write Selected" is clicked.
- **Clear Selected**: This option will hide and clear the value of the selected field but will not change the value.
- Select All: Selects all fields.
- Deselect All: Deselects any and all selected fields.

Note that clicking on a bit name will show bit description (see Figure 12). Hovering the cursor over a bit name will tell the user address and bit position (see Figure 14).

\checkmark	otf_thresh	0	1	00	°C				
\checkmark	diag_int_err_latch	0	false	\sim					
\checkmark	diag_vout_latch	0	false	\sim					
\checkmark	diag_fe_latch	0	false	\sim					
\checkmark	qvo_fine	0		0					
\checkmark	sens_fine	0		0		×			
Over-temperature threshold (step 5°C) 0x0: 100°C									
0x0F: 17	75°C					~			

Figure 13: Field definition by clicking desired field

\checkmark	ovd_dis			0	false 🗸		
\checkmark	clamp_dis			0	false \vee		
\checkmark	bw_sel			0	240	kHz	1
\checkmark	otf_dis bw_sel		1	0	false 🖂		1
\checkmark	otf_lat (Address: 0xE, bits 16	5:15)		0	false 🖂		
\checkmark	otf_thresh			0	100	°C	
F 1						d days a	

Figure 14: Hovering over a field shows the address

Accessing the Register Diagram

To access the register diagram, go to menu "Help" → Select "ACS37601 Register Diagram". This will open a dialog window identical to the window in Figure 15 below. See ACS37601 Datasheet section: "Customer Register Table" for detailed description of all individual bits.

															- 1	Bit N	umbe	r														
Address	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
0x0C							vout	sen	s_co:	arse	uni_	diag	rat_	diag	off	diag	sens	diag	diag	diag	diag	diag_	diag	diag	diag	diag	diag	diag	diag_	diag	diag_	diag
0x0D							diag	thok	diag	ocf_	ocf_	ocf_	ocf_	tmas	0	f_th	bld			ocf	n_th	resh					ocf	p_th	resh			reset
0x0E							diag	diag	diag		otf_t	hresh		otf_1	otf_	bw	sel	clam	ovd_	uvd	vout	diag	fault	fault	test	vout	test	test_	seq	analo	g_lo	unloc
0x0F									res	erved	_0f							sens	fine								q	vo_fi	1e			

Figure 15: ACS37601 Register Diagram

Manchester Programming Protocol

Under "Setup" \rightarrow "Device Setup...", the dialog menu in Figure 16 below will appear. In this menu, user can change various characteristics of the Manchester programming protocol used by the ASEK-20. To restore these settings to their default settings, click "Restore Defaults" button as shown in Figure 16. For more information about the device specific Manchester parameters, see the ACS37601 device datasheet, Device Programming section.



0	Device Setup	×
	Manchester	
	Programming Mode	Overvoltage 🗸 🗸
	Program Enable [V]	6.500
	Serial Pulse High Level [V]	4.700 🌩
	Serial Pulse Low Level [V]	0.300 🖨
	Slew Rate [V/uS]	0.750 🖨
	Speed [b/s]	20000 🖨
	Threshold [V]	2.000 🖨
	Initial Commands:	
		Restore Defaults
		OK Cancel

Figure 16: "Device Setup" menu defaults

Below, each Manchester option has been briefly defined:

- **Program Enable [V]**: Used to set the voltage for the Program Enable.
- Serial Pulse High Level [V]: Used to set the voltage for the high level of the Manchester signal.
- Serial Pulse Low Level [V]: Used to set the voltage for the low level of the Manchester signal.
- Slew Rate [V/µs]: Used to set the speed at which the Manchester signal will take to get from one voltage to another.
- **Speed [kb/s]**: Used to set the bit rate for communication with the ASEK.
- **Threshold** [V]: Used to set the threshold for determining the difference between a 1 and a 0 when performing register read.
- **Initial Commands**: Used for commands that must be sent to the ASEK-20 when it is being initialized.

Saving and Loading Memory Files

To save the memory as a tabular data file or text file, click "Save..." in the bottom right side of the GUI as shown in Figure 17. Clicking "Save..." will open a file explorer where the user can save the memory information as a CSV file or TXT file. Saving the memory is recommended before experimenting with programming so the user can return the device to its original factory-programmed state if necessary. The user can also save the memory by clicking "File" \rightarrow "Save Memory...".

To load a previously saved file containing memory information, click "Load..." button. User can also load a memory file by going to menu "File" \rightarrow "Load Memory...".

Load	
Save	Version 1.1.0
	COM4

Figure 17: "Load" and "Save" the memory to a file



Two-Point Programming

The goal of Two-Point Programming is to calculate and set device sensitivity using two known points. Two values of the magnetic field and two values of desired voltage output are needed to proceed.



Figure 18: Two-Point Programming Section

Prepare a test bench with the ACS37601 evaluation setup, a ferromagnetic core, and current-carrying conductor.

Step 1) Enter a "Voltage at current 1 [V]".

Step 2) Apply the first calibration field (corresponding to voltage at current 1) and press "Current Level 1" button.

Step 3) Enter a "Voltage at current 2 [V]".

Step 4) Apply the second calibration field (corresponding to voltage at current 2) and press "Current Level 2" button.

TIPS AND TRICKS FOR TWO-POINT PROGRAMMING

The coarse gain value "*sense_coarse*" or field polarity orientation "*vout_pol*" bits should not be changed by customer, otherwise device performance from datasheet is not guaranteed.

Two-Point algorithm is adjusting "*sens_fine*" value which have to result in sensitivity within Sensitivity Programmable Range (Table 1) for given Part Number. Value of "*qvo_fine*" is adjusted to minimize error of Voltage at current 2.

If calculated "*sens_fine*" or "*qvo_fine*" value is out of the expected range, GUI will show error message.

Part Number	Factory Programmed Sensitivity (mV/G)	Magnetic Field Range (G) at Factory Sensitivity Trim	Sensitivity Programmable Range (mV/G)	Magnetic Field Range (G) at Min. Sensitivity Trim	Magnetic Field Range (G) at Max. Sensitivity Trim
ACS37601LKTATN-0P5B5-C	0.5	±4000	0.5 to 0.86	±4000	±2326
ACS37601LKTATN-001B5-C	1	±2000	0.83 to 1.44	±2410	±1389
ACS37601LKTATN-002B5-C	2	±1000	1.24 to 2.16	±1613	±926
ACS37601LKTATN-001B3-C	1	±1332	0.82 to 1.43	±1624	±931

Table 1: Sensitivity Programming Range







Figure 19: ASEK37601 Daughterboard Schematic



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Revision History

Number	Date	Description
_	May 31, 2022	Initial release
1	March 21, 2023	Updated Two-Point Programming section (page 6)

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