APEK89332-3

A89332-3 Evaluation Board User Guide

DESCRIPTION

The A89332-3 evaluation board is designed to aid users in evaluating the operation and performance of the A89332-3 motor-controller integrated circuit (IC). This user guide provides detailed information about the evaluation board and, with the A89332 family programming/application guide, enables users to quickly program the A89332-3 device and evaluate its motor-control applications.

FEATURES

- USB communications allow graphical user interface (GUI) software to control and program the device via inter-integrated circuit (I^2C) interface
- Test points allow monitoring and evaluating performance

EVALUATION BOARD CONTENTS

- APEK89332GEX-01-T-3 evaluation board

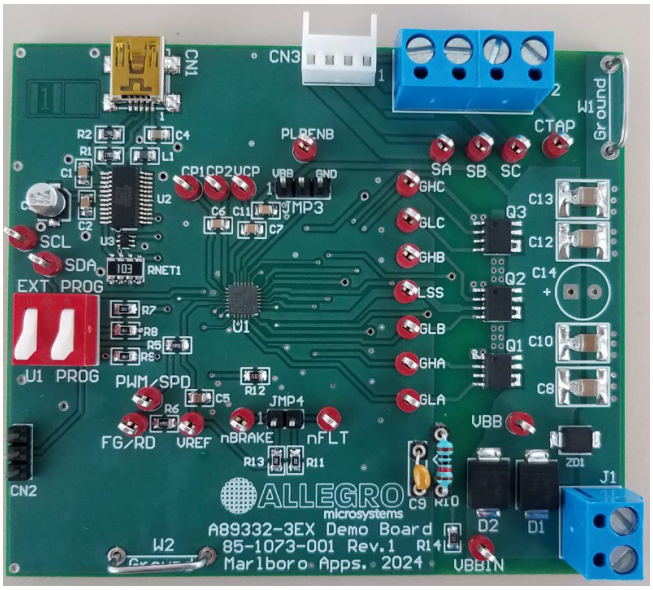


Figure 1: A89332-3 Evaluation Board

Table 1: A89332-3 Evaluation Kit/Board Configurations

Configuration Name	Part Number
APEK89332GEX-01-T-3	A89332BGEXSR-1

Table of Contents

USING THE EVALUATION BOARD

Equipment Required

- Three-phase brushless DC (BLDC) motor
- DC power supply to power the evaluation board
- Standard A male-to-mini B male USB cable (not included)
- Personal computer for controlling the USB and running the GUI
- GUI Software and Programming Guide—See the Related Links section

Step 1: Make Evaluation Board Connections

A. Mini USB connection (CN1): Connect USB cable to computer.

B. Motor-terminal connections (CN3 or J2): Connect the motor terminals* and, optionally, the CTAP.

*WARNING: The default settings in the A89332-3 may not be appropriate for the motor used, which could cause damage to the IC or motor. To prevent such damage, initially limit the power supply current to 25 to 50% of the rated current of the motor, then remove this limit when the optimal setting is reached.

C. Power-supply input (J1): Connect the power supply to this connector.

D. I²C selection (SW1): Flip the switch to the U1 PROG position.

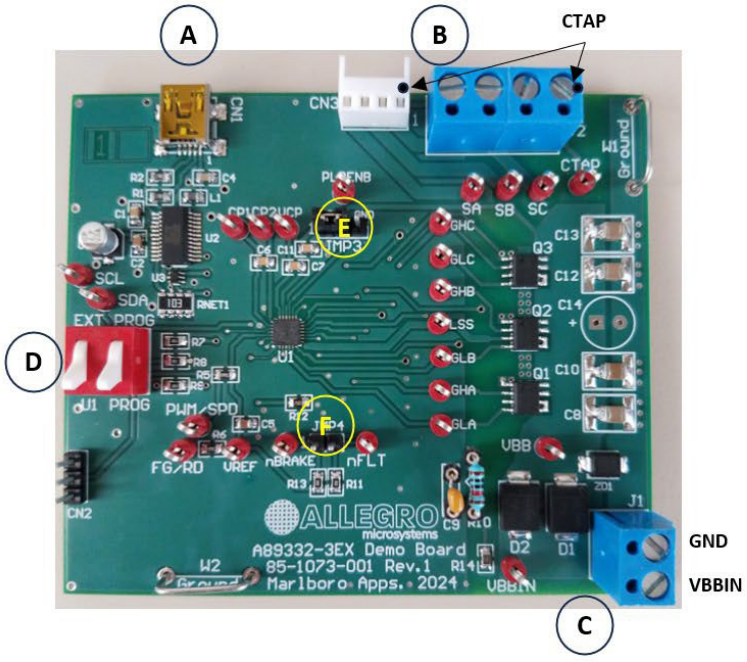
E. Power-loss brake selection (JMP3):

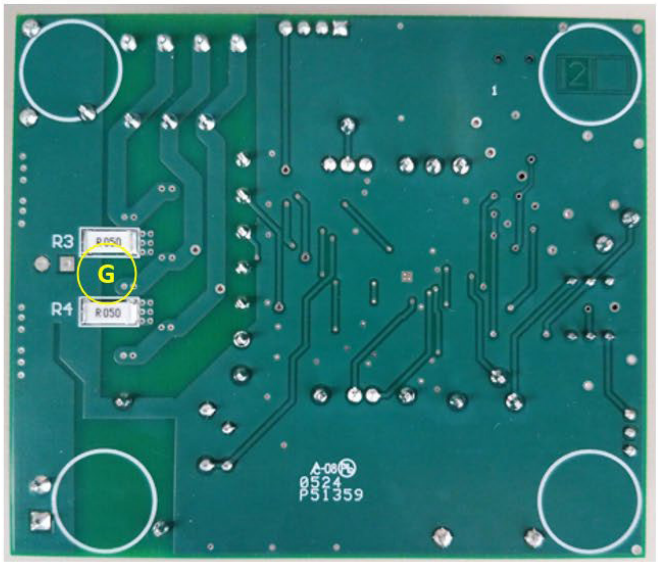
- To enable the power-loss function (default), install a jumper between pin 1 and 2.
- To disable the power-loss function, install a jumper between pin 2 and 3.

F. nFLT brake function selection: To disable this function (default), do not use a jumper.

G. OCL sense resistors (R3//R4).

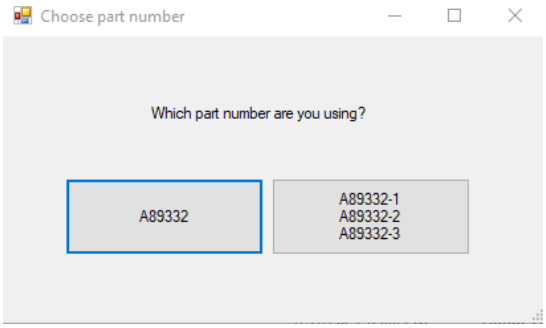
H. Set power supply to appropriate voltage and current, then turn on.



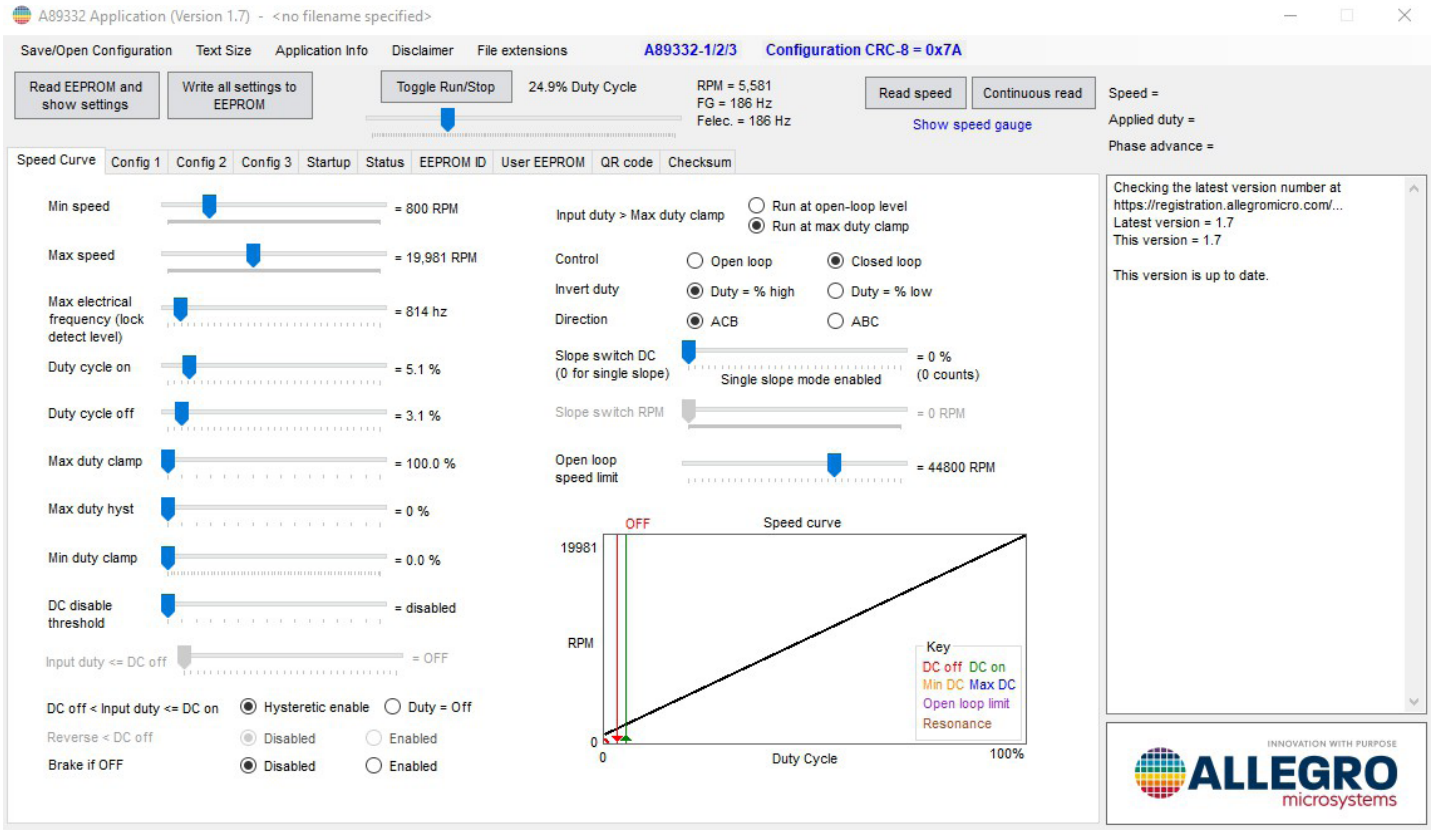


Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

Step 2: Launch GUI and Choose Appropriate Device

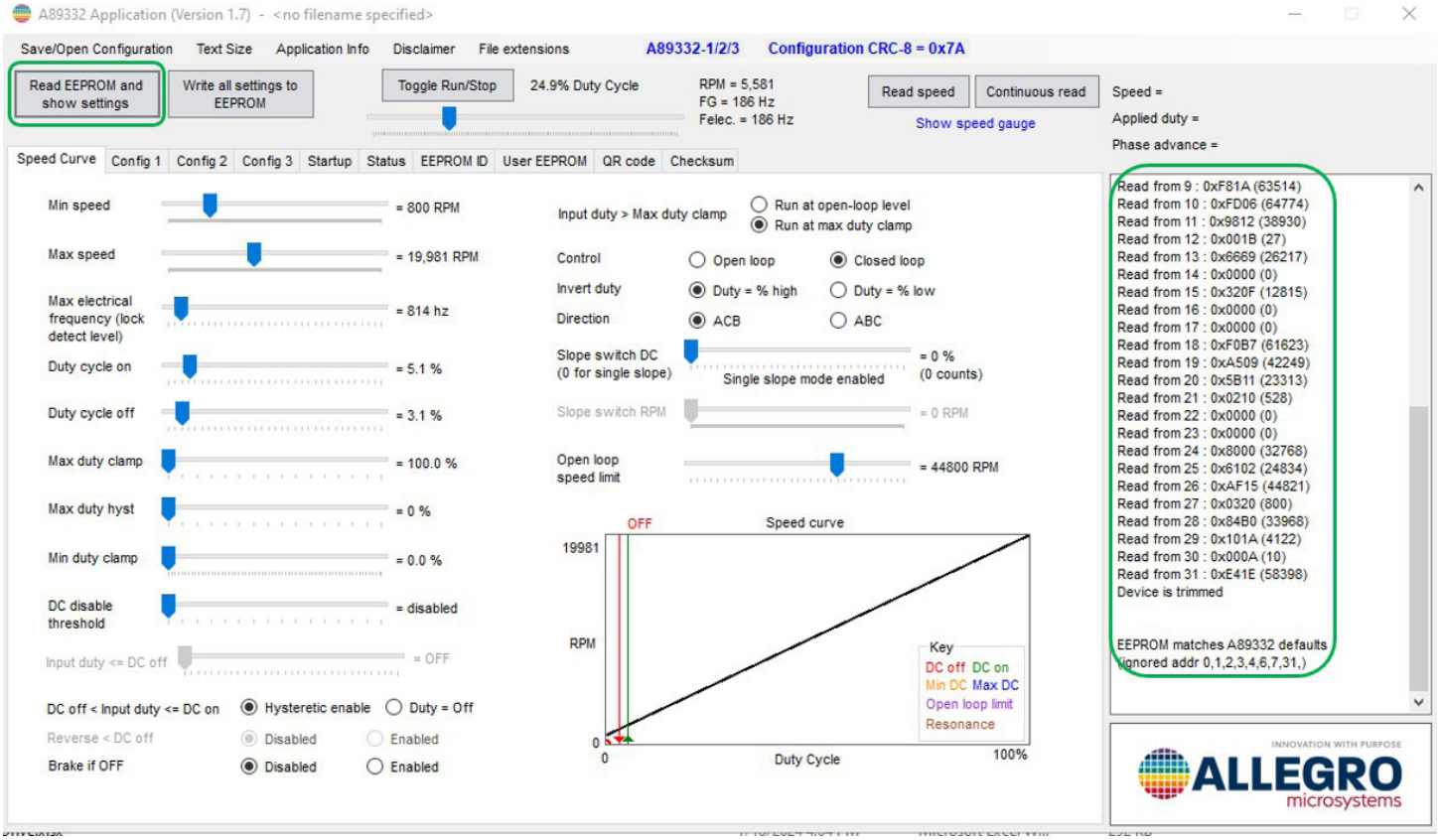


Step 3: Select A89332-1/2/3



Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

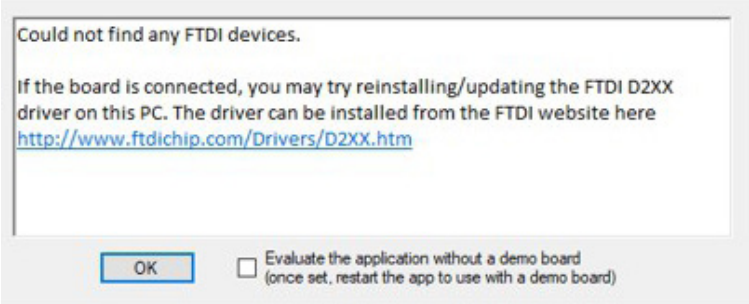
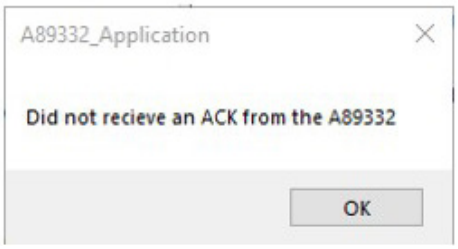
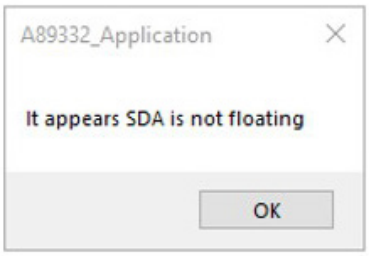
Step 4: Click the "Read EEPROM and Show Settings" Button



After clicking the "Read EEPROM and Show Settings" button, the programmed EEPROM values are displayed in the console window to the right. For an unprogrammed device, all zeros are displayed.

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

Some **Error Messages** that may occur while using the GUI and the recommended actions follow:

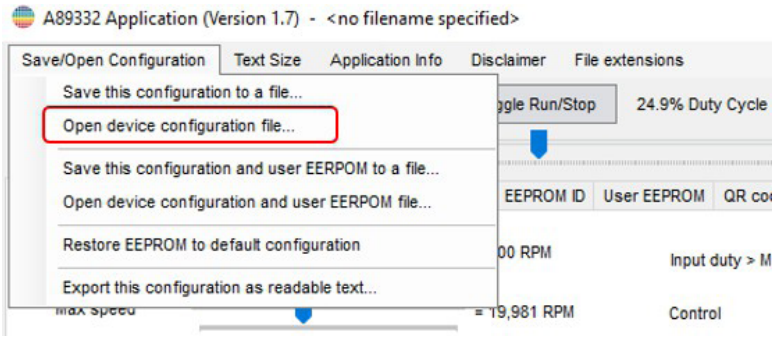
Error Prompt	Error Screen	Recommended Action
Could not find any FTDI devices		Ensure the USB cable is connected. If the cable is connected, the FTDI D2XX driver may need to be installed.
Did not receive an ACK from the A89332		Ensure the power supply is ON and SW1 is set to the U1 PROG position.
It appears SDA is not floating		Attempt to communicate with the device a few more times. I2C_SDA is shared with the FG/RD pin; therefore, the pin can be pulled low by the typical FG function or if the RD function is selected. In this case, reduce the VBB below the device UVLO level and try again.

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

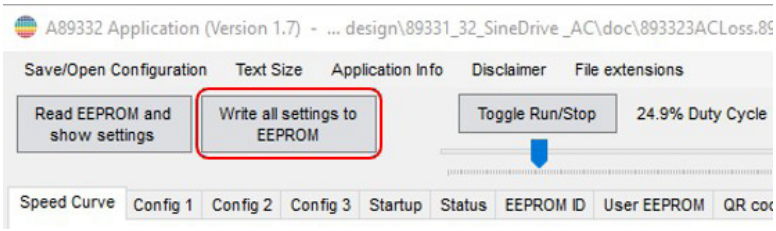
Step 5: Load Saved Parameters or Restore EEPROM to Default

Device configuration parameters can be saved to a file.

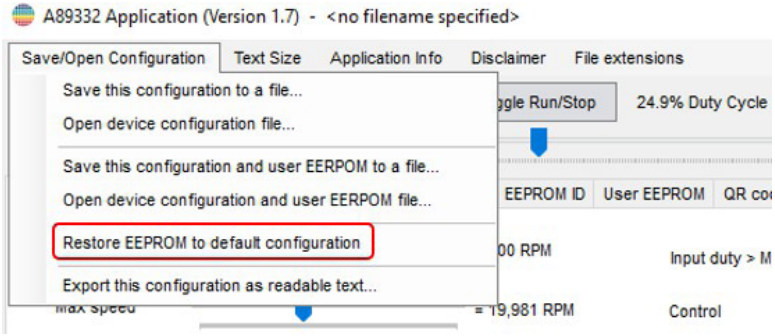
- **If a file for this (or similar) application has been created:**
  - A. Open the configuration file as follows:
    - i. Click on the Save/Open Configuration tab.
    - ii. Select "Open device configuration file."
    - iii. Follow the prompts from the GUI.



  - B. After the file is loaded, program the device as follows:
    - i. Click the "Write all settings to EEPROM" button.



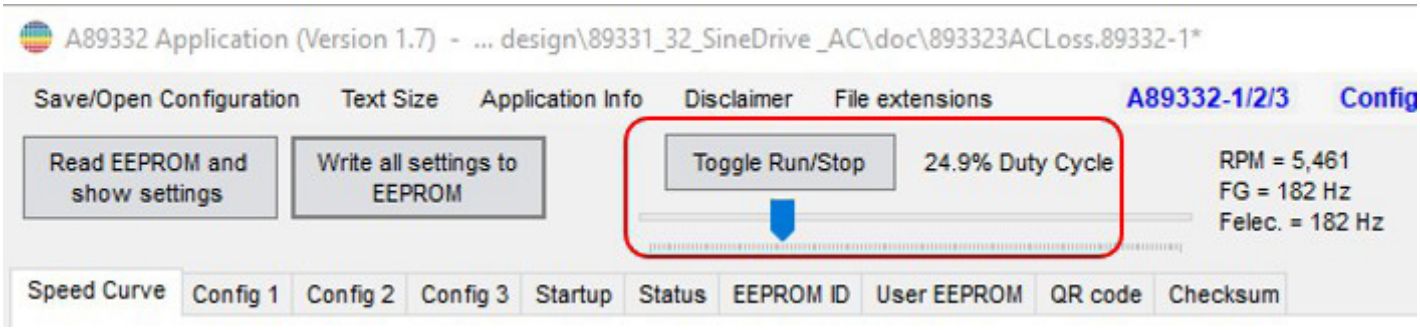
- **If the device has not been programmed:**
  - A. Program the default configuration to the device as follows:
    - i. Select the "Restore EEPROM to default configuration" button (located on the same tab).
    - ii. Follow the prompts.



Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

Step 6: Set the Command Duty and Start the Motor

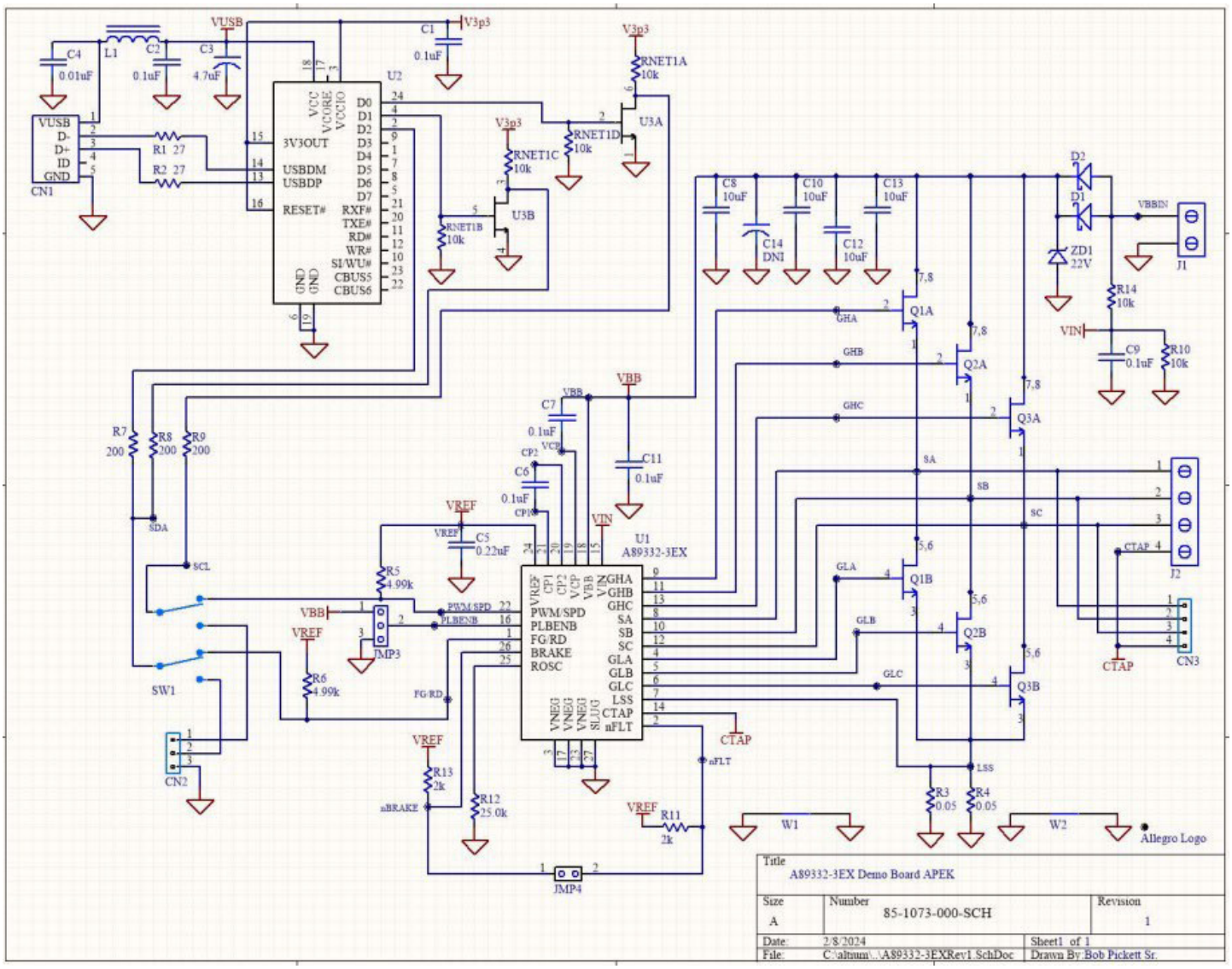
Set the command duty using the command slider (start with low demand initially) and start the motor by clicking the Toggle Run/Stop button.



Step 7: For More Detailed Information, See the A89332 and A89332-1/2/3 Programming Guide

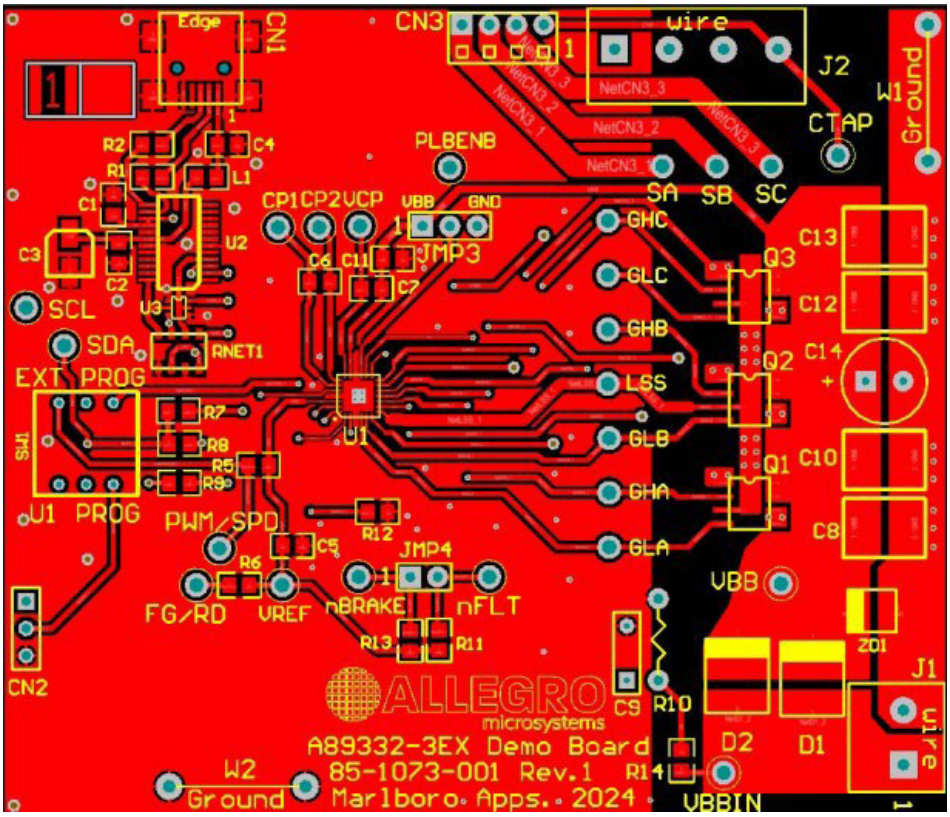
Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

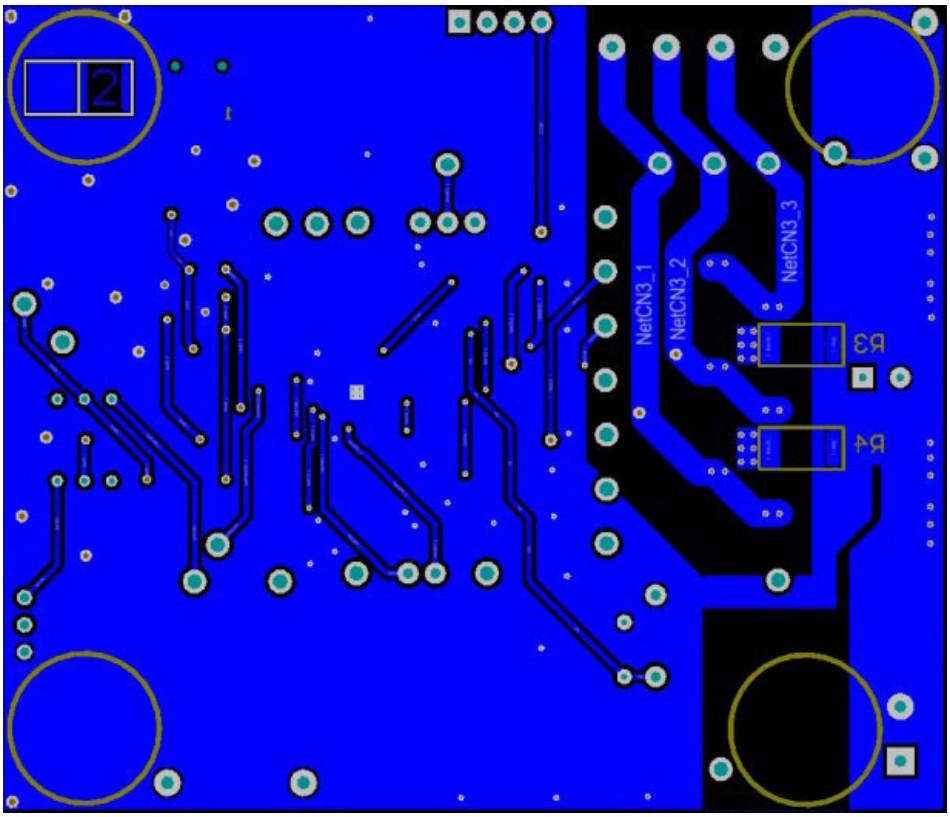
SCHEMATIC



Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

LAYOUT





Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

BILL OF MATERIALS

Table 2: A89332-3 Version Evaluation Board Bill of Materials

Item	Quantity	Designator	Value	Description	Part Type	Footprint
1	5	C1, C2, C6, C7, C11	0.1 µF	50 V Capacitor	TDK CEU4J2X7R1H104K125AE; Digikey 445-7856-1-ND	0805
2	1	C3	4.7 µF	35 V Capacitor	Chemi-Con EMZA350ADA4R7MD61G; Digikey 565-2553-1-ND	UCC D61 Cap
3	1	C4	0.01 µF	50 V Capacitor	Yageo CC0805KRX7R9BB103; Digikey 311-1136-1-ND	0805
4	1	C5	0.22 µF	50 V Capacitor	Murata GCM21BR71H224KA37L; Digikey 490-4970-1-ND	0805
5	4	C8, C10, C12, C13	10 µF	50 V Capacitor	Samsung CL32B106KBJNNWE; Digikey 1276-3388-1-ND	2220
6	1	C9	0.1 µF	50 V Capacitor	Vishay K104K15X7RF5TL2; Digikey BC1084CT-ND	0.2" Cap
7	1	C14	Not Installed		DNI	Cap_8mmDia_3p5mmSpacing
8	1	CN1		USB 2.0 Connector	EDAC 690-005-299-043; Digikey 151-1206-1-ND	EDAC 690-005-299-043
9	8 Pins	CN2, JMP3, JMP4		Cut from 50-Pin Strip	Samtec TSW-150-07-T-S; Digikey SAM1035-50-ND	3-Pin 0.1" Connector, 3-pos. shunt, 2-pos. shunt
10	1	CN3		Molex 4-Pin Verticle Recepticle	Molex 22-02-2045; Digikey WM3202-ND	Molex 4-Pin 4455-N Vertical
11	24	CP1, CP2, CTAP, FG/RD, GHA, GHB, GHC, GLA, GLB, GLC, LSS, nBRAKE, nFLT, PLBENB, PWM/SPD, SA, SB, SC, SCL, SDA, VBB, VBBIN, VCP, VREF		Large Test Point	Keystone 5010; Digikey 36-5010-ND	PAD 57 125 TP HB
12	2	D1, D2		40 V/3 A Schottky Diode	On Semiconductor MBRS340T3G; Digikey MBRS340T3GOSCT-ND	DO-214AB
13	4			Bumpon Foot	3M SJ-5303 (CLEAR); Digikey SJ5303-7-ND	Bumpon Foot
14	1	J1		2-Pin Screw-Down Connector	On Shore Technology ED120/2DS; Digikey ED1609-ND	2-pin screw-down connector
15	1	J2		4-Pin Screw-Down Terminal Block	On Shore ED120/4DS; Digikey ED2227-ND	4-pin screw-down connector
16	1	L1		Ferrite Bead	Laird MI0805K400R-10; Digikey 240-2389-1-ND	0805
17	1			PCB	85-1073-001 Rev.1	
18	4 Pins	QC9, QR10		Socketed for C9 and R10	Mill-Max 310-43-164-41-001000; Digikey ED6264-ND	
19	3	Q1, Q2, Q3		Dual N-Channel MOSFET	Diodes Inc. DMG4800LSD-13; Digikey DMG4800LSD-13DICT-ND	8-pin SO
20	2	R1, R2	27 Ω	1/8 W Resistor	Vishay/Dale CRCW080527R0FKEA; Digikey 541-27.0CCT-ND	0805
21	2	R3, R4	0.05 Ω	2 W Resistor	Ohmite MCS3264R050FER; Digikey MCS3264R050FERCT-ND	2512
22	2	R5, R6	4.99 kΩ	1/8 W Resistor	Panasonic ERJ-6ENF4991V; Digikey P4.99KCCT-ND	0805
23	3	R7, R8, R9	200	1/8 W Resistor	Panasonic ERJ-6GEYJ201V; Digikey P200ACT-ND	0805
24	1	R10	10 kΩ	1/4 W Resistor	Stackpole RNF14FTD10K0; Digikey RNF14FTD10K0CT-ND	0.3" resistor
25	2	R11, R13	2 kΩ	1/8 W Resistor	Panasonic ERJ-6GEYJ202V; Digikey P2.0KACT-ND	0805
26	1	R12	25 kΩ	1/10 W Resistor	TE Connectivity CPF-A-0805B25KE; Digikey A124124CT-ND	0805
27	1	R14	10 kΩ	1/8 W Resistor	Stackpole RMCF0805FT10K0; Digikey RMCF0805FT10K0CT-ND	0805
28	1	RNET1	10 kΩ	4 Isolated Resistors	Yageo YC324-JK-0710KL; Digikey YC324J-10KCT-ND	CTS 744 series
29	1	SW1		Dual SPDT Switch	Grayhill 76STC02T; Digikey 76STC02T-ND	76STC02T
30	1	U1		Three-Phase Sensorless Fan Driver	A89332-3EX	26-pin EX
31	1	U2		USB 8-Bit FIFO IC	FTDI FT240XS-R; Digikey 768-1127-1-ND	SSOP-24 (150 mm)
32	1	U3		Dual N-Channel FETs	Toshiba Semi SSM6N15AFU,LF; Digikey SSM6N15AFULFCT-ND	SOT-363
33	2	W1, W2		22-Gauge Buss Wire (300 mm above PCB)	Alpha Wire 298 SV005; Digikey 298SV005-ND	Scope ground
34	1	ZD1	22 V	TVS Zener	Littelfuse SMBJ22A; Digikey SMBJ22ALFCT-ND	DO-214AA

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

RELATED LINKS

A89332-3 Product Page: https://www.allegromicro.com/en/products/motor-drivers/bldc-drivers/a89331

Both GUI software and Programming Guide can be downloaded from the Allegro Customer Portal, which requires registration and login at: http://registration.allegromicro.com/login

APPLICATION SUPPORT

For applications support contact, go to https://www.allegromicro.com/en/about-allegro/contact-us/technical-assistance and navigate to the appropriate region.

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com

Revision History

Number	Date	Description
–	February 23, 2024	Initial release

Allegro MicroSystems
955 Perimeter Road
Manchester, NH 03103-3353 U.S.A.
www.allegromicro.com