

A17802 Evaluation Kit User Guide

DESCRIPTION

The A17802 evaluation kit provides an easy way to evaluate the Allegro A17802 integrated circuit (IC) using a computer running Microsoft Windows. The downloadable demonstration application provides a graphical user interface (GUI) that displays the measured angle from the A17802 and provides configuration control using Manchester or SPI protocols.

FEATURES

The kit features a four-cycle coil design printed on the sensor board, a rotatable four-cycle target mounted atop the board, a microcontroller that decodes sensor data, and a Windows application downloadable from the Allegro software website

EVALUATION KIT CONTENTS

The hardware includes:

- STM Nucleo-L432KC microcontroller board (white board; see Figure 1, left)
- A17802 programming board (plugs into the microcontroller board)
- A17802 sensor board (see Figure 1, right)
- Four-cycle inductive target (mounted to the sensor board)
- Ten-pin ribbon cable (see Figure 1, center)
- Micro-USB cable (connects the microcontroller board to a computer; see Figure 1, far left)

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Figure 1: A17802 Evaluation Kit

USING THE EVALUATION KIT

Accessing the Software Website

Allegro hosts software and firmware for its supported devices at <https://registration.allegromicro.com/>. Access to the content requires Allegro approval of a request from a registered account.

NOTE: Permission can only be granted after hardware delivery.

Unregistered Users

1. Navigate to <https://registration.allegromicro.com/>.
2. Select "Create an Account".
3. In the Account Type section, select the Allegro Software radial menu option.
4. In the Customer Information section, complete the required fields.
5. In the Create a Password section, complete the required fields.
6. In the Registered Parts section, click the Add Part button.
7. In the Add Part dropdown menus, make the following selections:
 - Select category: Inductive Position Sensor
 - Select sub-category: Motor Position Sensor
 - Select part: A17802
8. Click the Create an Account button.

Registered Users

1. Navigate to <https://registration.allegromicro.com/>
2. Log in.
3. Select "Find a Part".
4. In the Select by Part Number field, type the part number.
5. Locate the part number in the list below the search input, and click the Add button.

Software Files

The A17802 software is hosted at <https://registration.allegromicro.com/#/parts/A17802>. The following files are available for download:

- **Demonstration Application:** This is the Windows program. Download, unzip, and run the .exe file to start the program.
- **Firmware Image:** This is the microcontroller firmware for the related demonstration application.
- **Command Library:** This library is a set of .dll files that can be useful for MATLAB. This library is not used for evaluation kit functionality.

Firmware Management

A firmware version is preinstalled on the microcontroller. However, the preinstalled version might not be compatible with the latest demonstration application. Each version of the demonstration application requires installation of a specific firmware version, as indicated by the files included together as part of a release. For example, the demonstration application version 0.7.3 requires firmware version 1.0.0, as shown in Figure 2.

Determine if the microcontroller firmware requires an update and download an update (if needed) as follows:

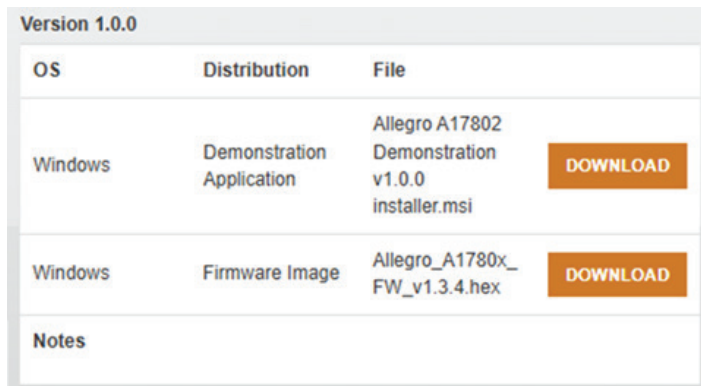
1. Connect the USB cable between the computer and the microcontroller board.
2. Download the latest demonstration application
3. Install the latest demonstration application
4. Run the .exe file
5. Click the Setup menu
6. Click Communication Setup.
7. If the COM port is not listed as "Active", change the COM port selection until the Communication field changes to "Active".
8. Compare the stated version number with the .hex file version on the software website (see Figure 3). If the version num-

ber of the software on the website is greater than the version number of the firmware installed on the microcontroller, the firmware on the microcontroller requires an update for the latest demonstration application to function properly.

9. If needed as determined in the previous step, install new firmware onto the microcontroller as follows:
 - A. Download the firmware .hex file from the Allegro website.
 - B. Download and install the STM32CubeProgrammer software from the STMicroelectronics website (www.st.com).

DISCLAIMER: Use of third-party software is subject to its terms and conditions. Allegro declines all related liability and responsibility.

- C. Connect the USB cable between the computer and the microcontroller board.
- D. Run STM32.
- E. On the main window, click the Connect button.
- F. Click the Open File tab, and browse to the firmware .hex file.
- G. Click the Download button.
- H. Close STM32 and unplug the USB cable.



Version 1.0.0		
OS	Distribution	File
Windows	Demonstration Application	Allegro A17802 Demonstration v1.0.0 installer.msi DOWNLOAD
Windows	Firmware Image	Allegro_A1780x_FW_v1.3.4.hex DOWNLOAD
Notes		

Figure 2: Software Release On Allegro Website

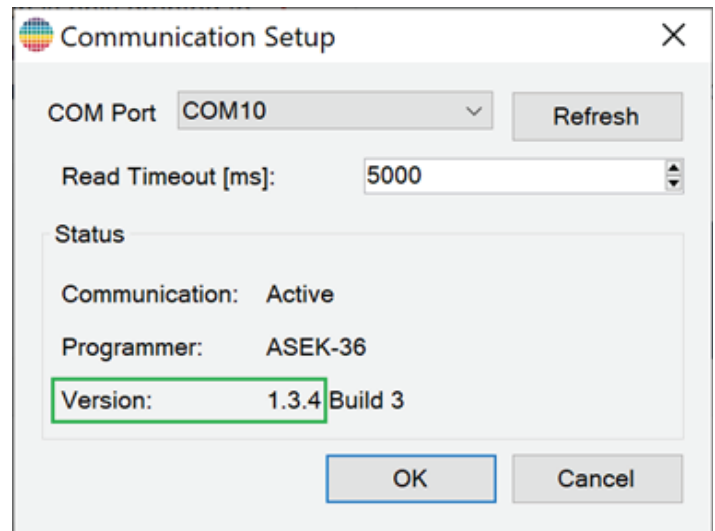


Figure 3: Version of Installed Firmware

Running the Demonstration Application

1. Connect the hardware, including connection of the USB cable from the computer to the microcontroller board, as shown in Figure 1.
2. Run the demonstration application .exe file in Windows.
3. Ensure the application successfully detects the correct COM port:
 - If the sidebar on the right side of the GUI displays the correct COM port number and a red Power Off button (as shown in Figure 4), the application successfully detects the COM port.
 - If the sidebar at the right of the GUI displays the status “Unconnected”, manually select the correct COM port as follows:
 - A. Click Setup.
 - B. Click Communication Setup.
 - C. Change the COM port selection until the Communication field changes to “Active”.
4. Ensure the Device Setup options in the Setup menu are configured properly. To power up the A17802 and enable memory access, customer access codes must be sent via Manchester or SPI interface. The Device Setup option in the Setup menu allows selection of the communication protocol and its speed. Manchester interface with 2 kb/s speed is recommended.
5. After the application detects the COM port (as shown in Figure 4), click the Power On button to power up the A17802.
6. Leverage application functions as desired:
 - To display the measured sine and cosine outputs and the corresponding electrical angle of the target, select the desired option: “Read Once” or “Start Reading”.
 - To change the signals and the angle, hand-rotate the target.

See Figure 6.

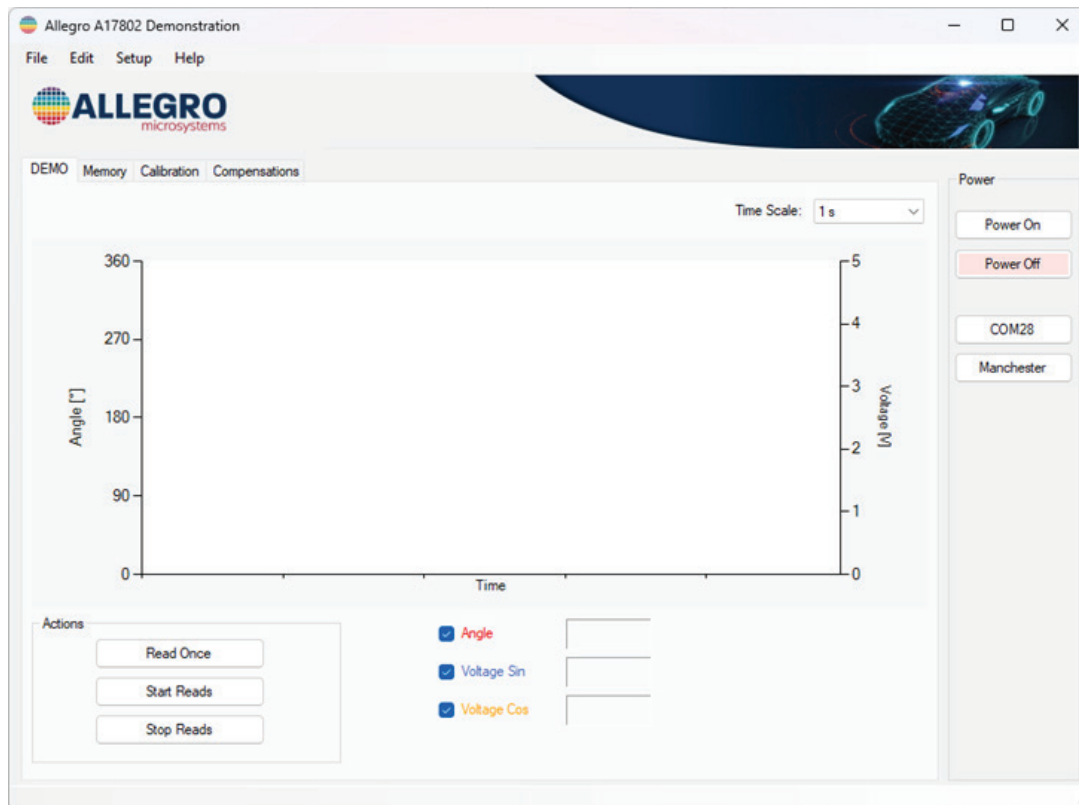


Figure 4: Application When COM Port Is Detected

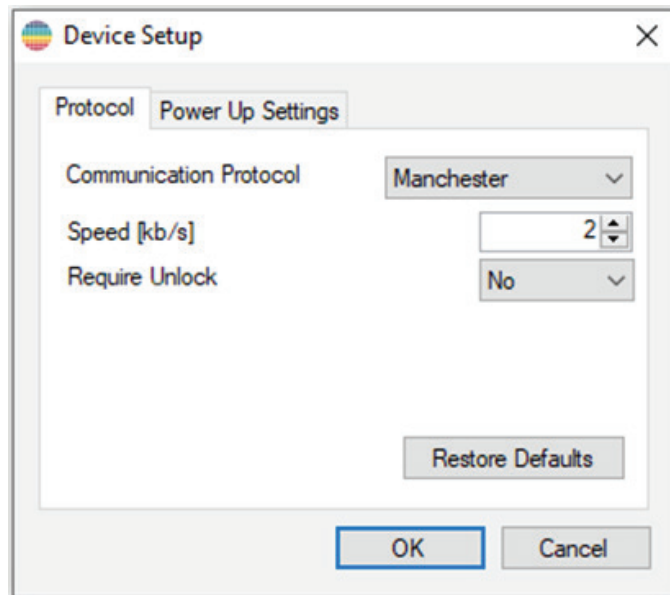


Figure 5: Device Setup



Figure 6: Running the Application

Using the Memory Tab

The Memory tab is used to read or write any field in the A17802 memory. The Memory tab includes tabs for Direct Memory, EEPROM, Shadow Memory, and Volatile Memory. When a field is selected, the lower panel of the GUI displays a short description about that field. To use this interface, select the checkbox that precedes the desired field(s), then click an action button in the panel located to the right.

To change the device programming, use the EEPROM tab as follows: 1) Click the relevant checkboxes; 2) Enter the desired

values in the Value fields; and 3) Click the Write Selected button. The newly written values should display in subsequent executions of the Read Selected button.

The Show dropdown menu toggles the display between the field name and the memory location of the selected field. To search and filter for a particular field or address, use the Search Name and Descriptor search field.

NOTE: Certain changes to IC programming do not take effect until a power-cycle is performed via the Power Off and Power On buttons.

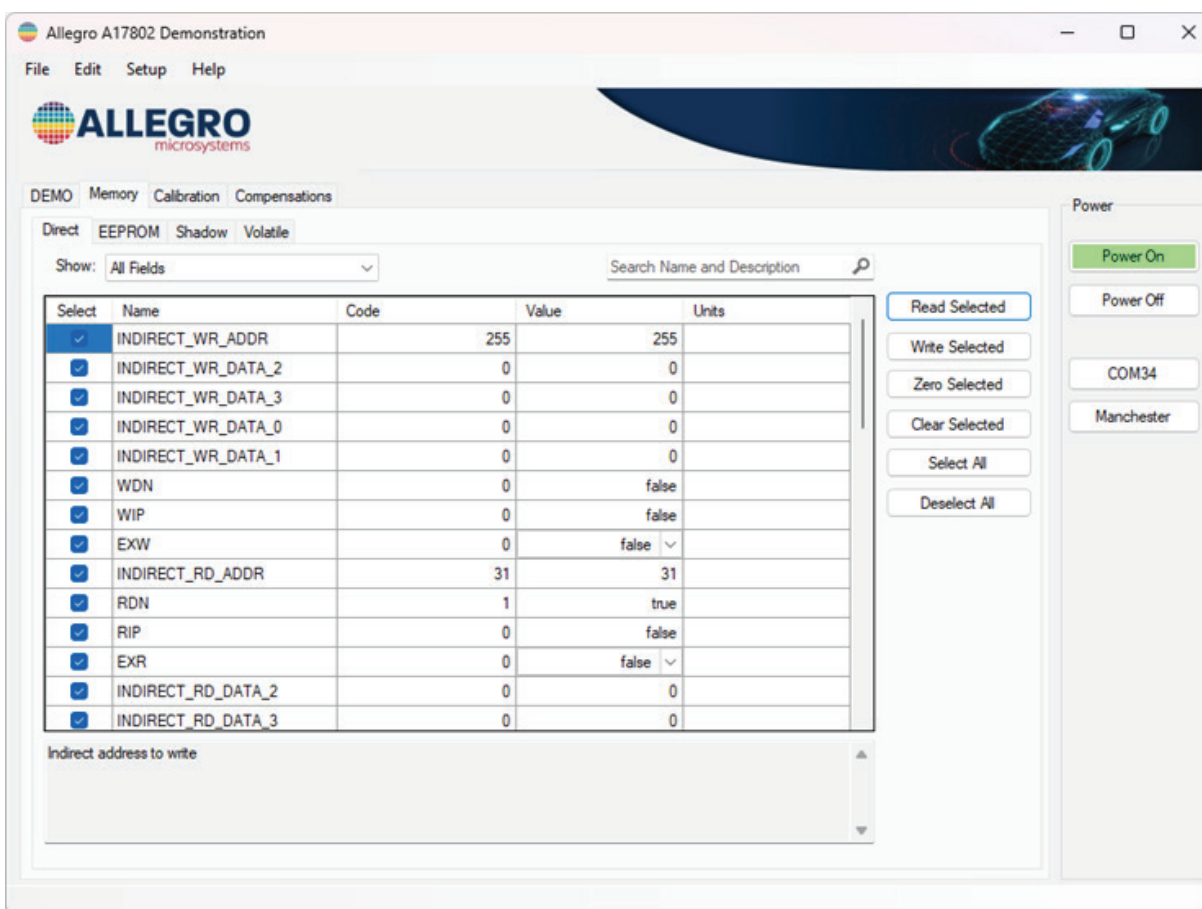
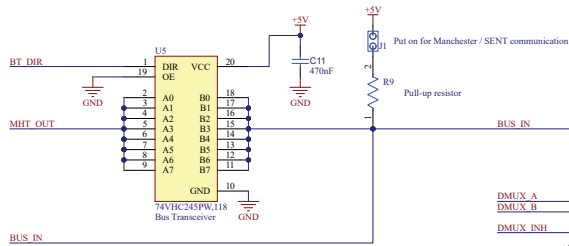


Figure 7: Memory Tab

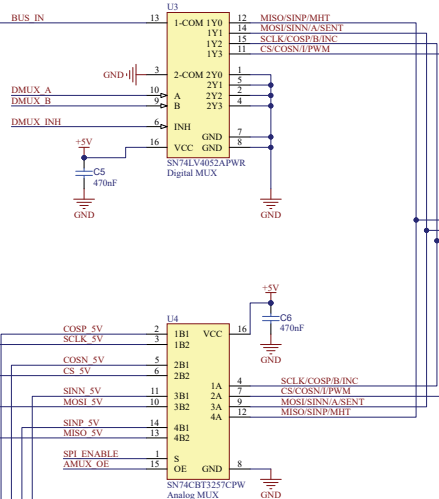
SCHEMATIC

Programmer Board

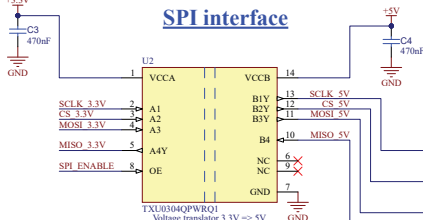
Manchester interface



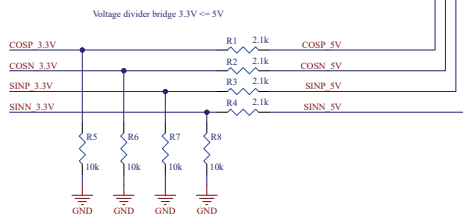
Signals forwarding



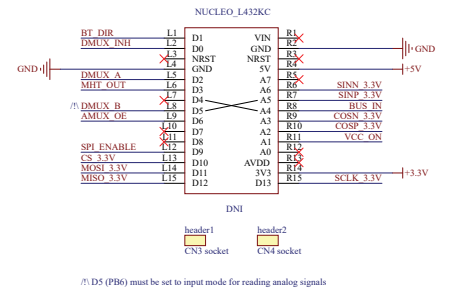
SPI interface



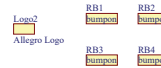
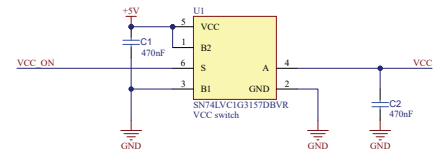
Analog signals interface



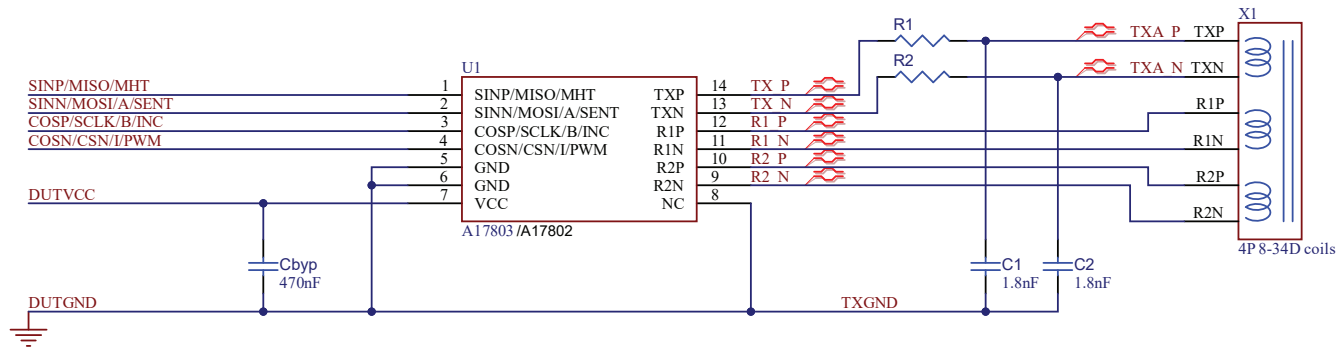
Nucleo Pinout



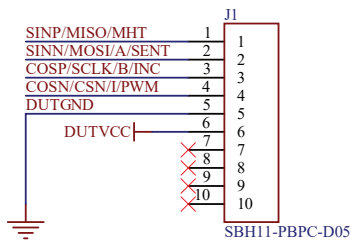
VCC supply control



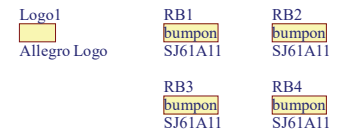
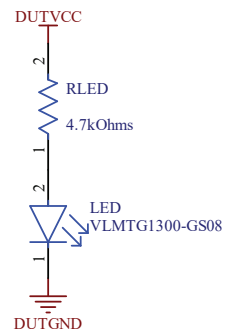
Sensor Board



Input Connector

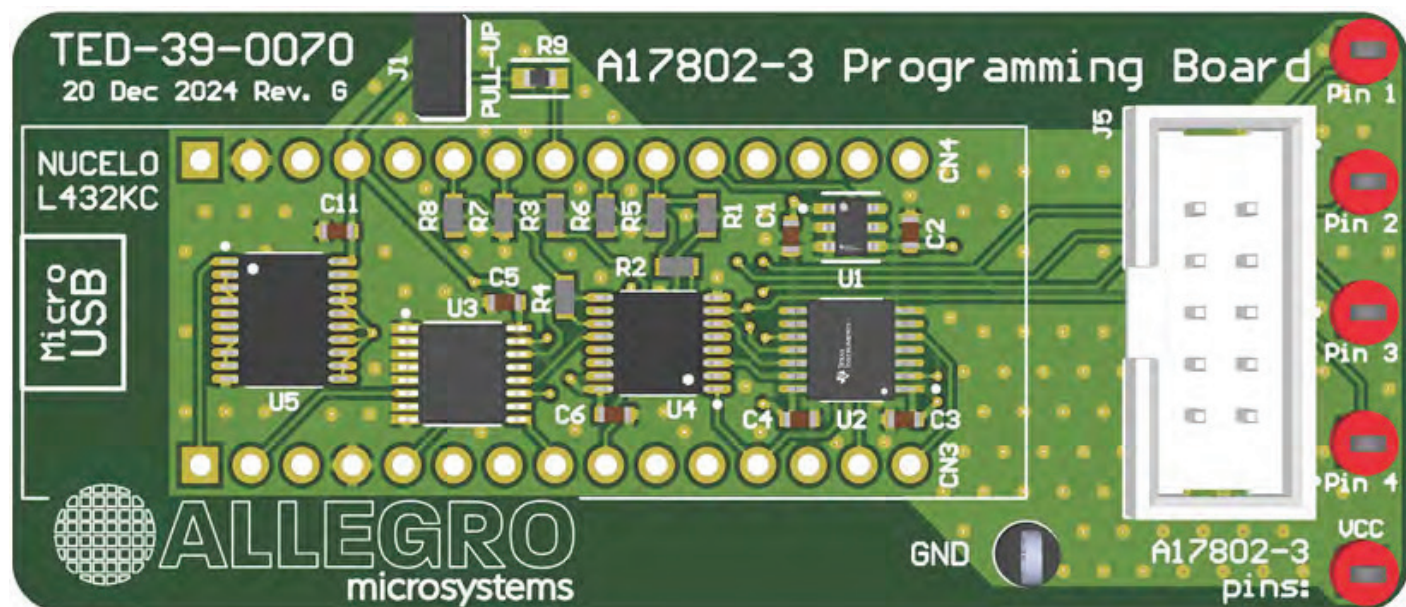
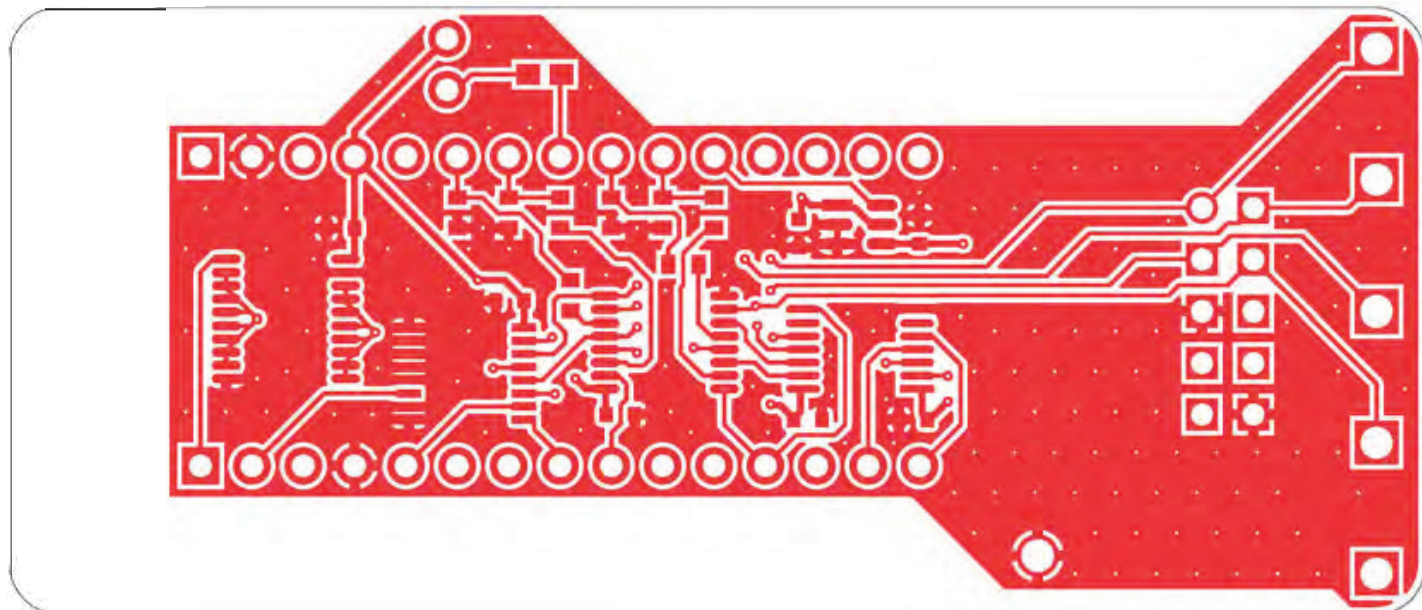


Vcc LED

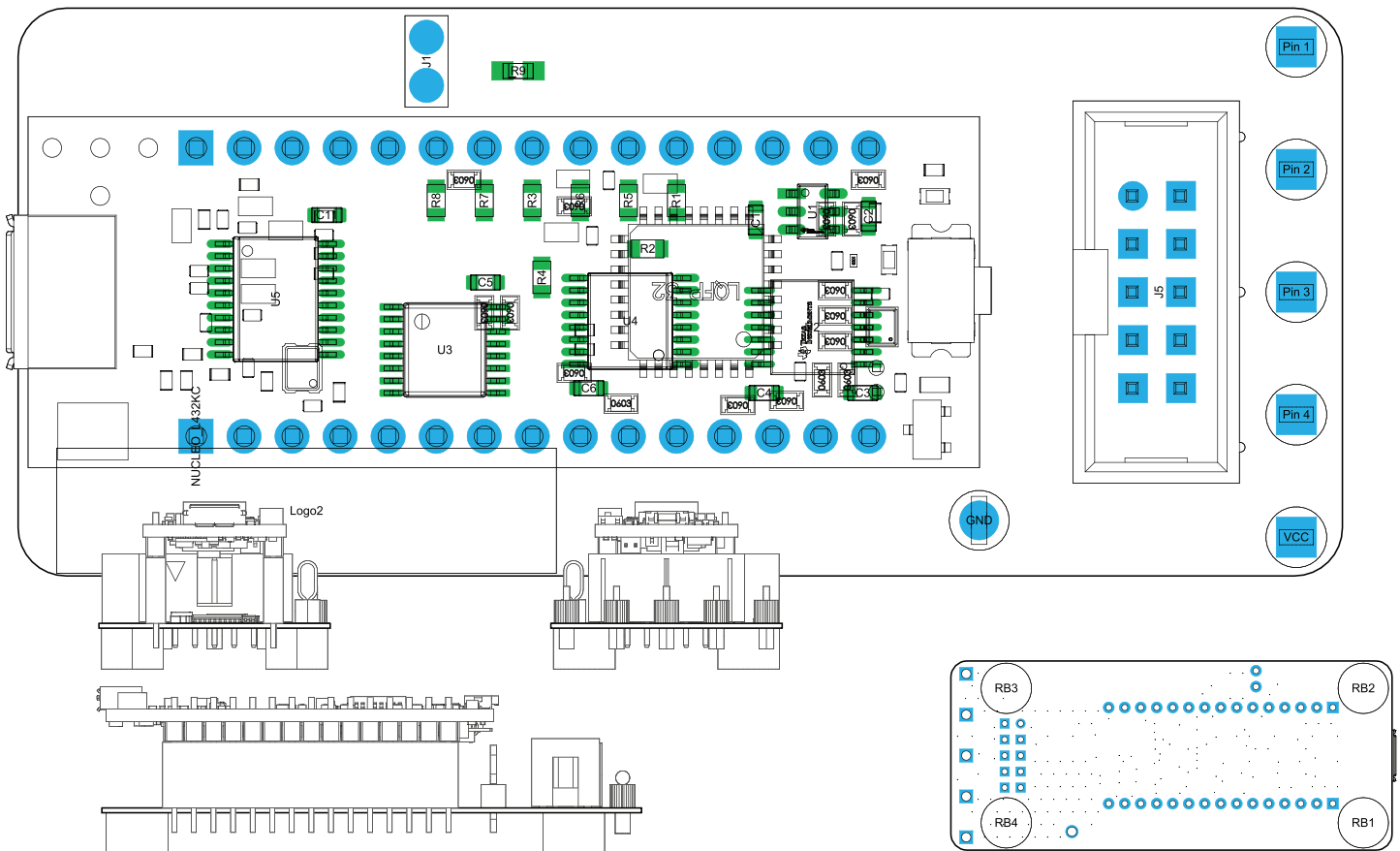


LAYOUT

Programmer Board

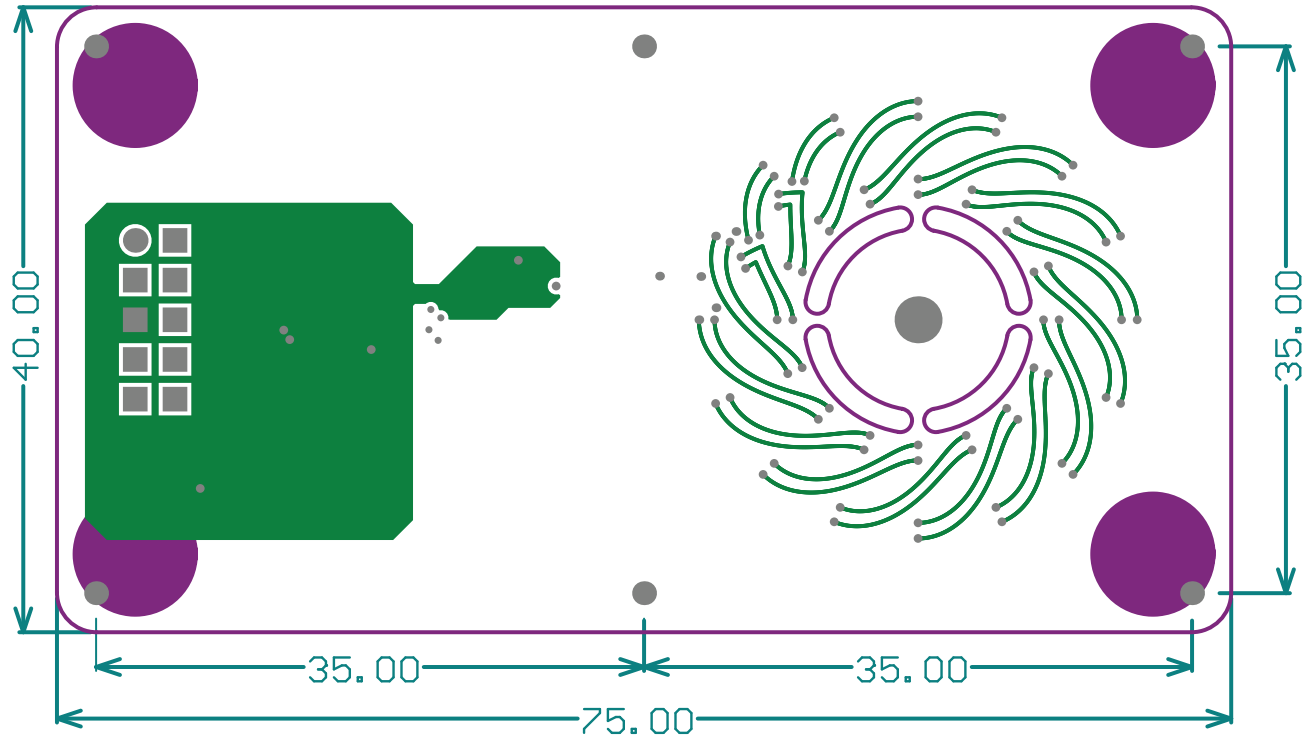
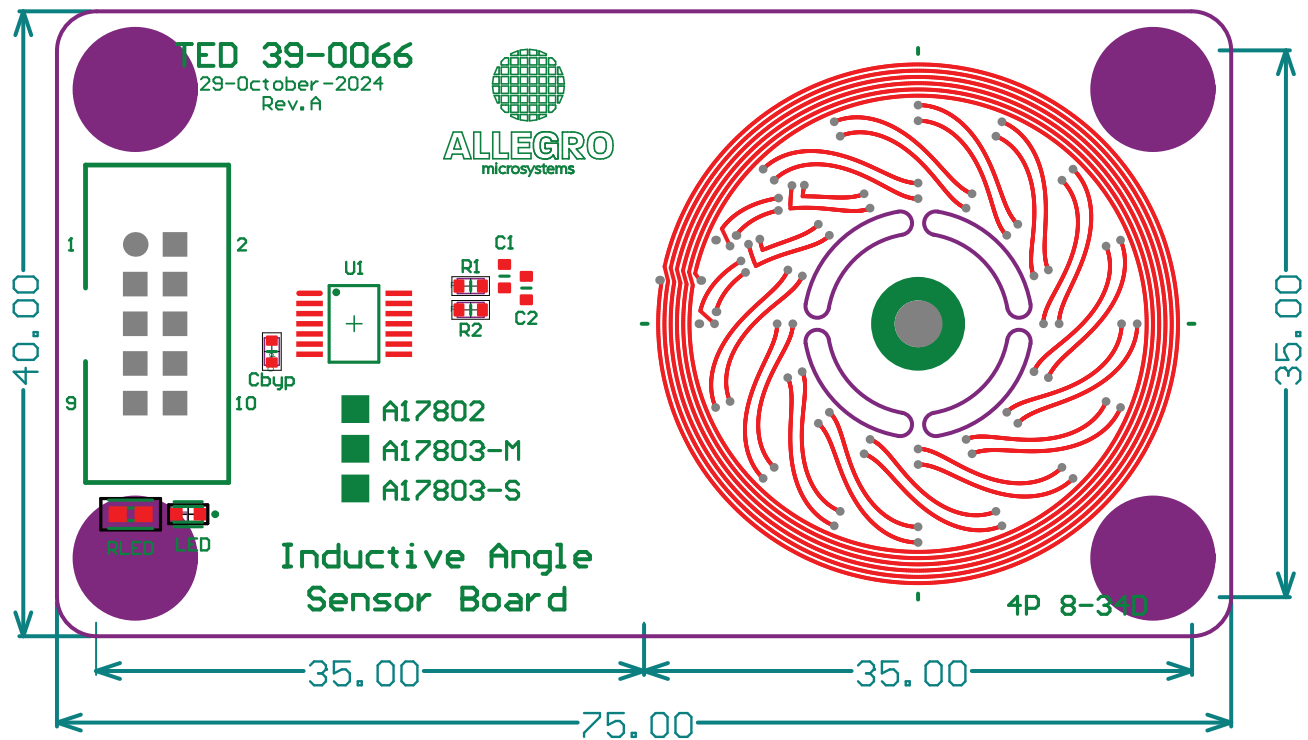


LAYOUT (continued)

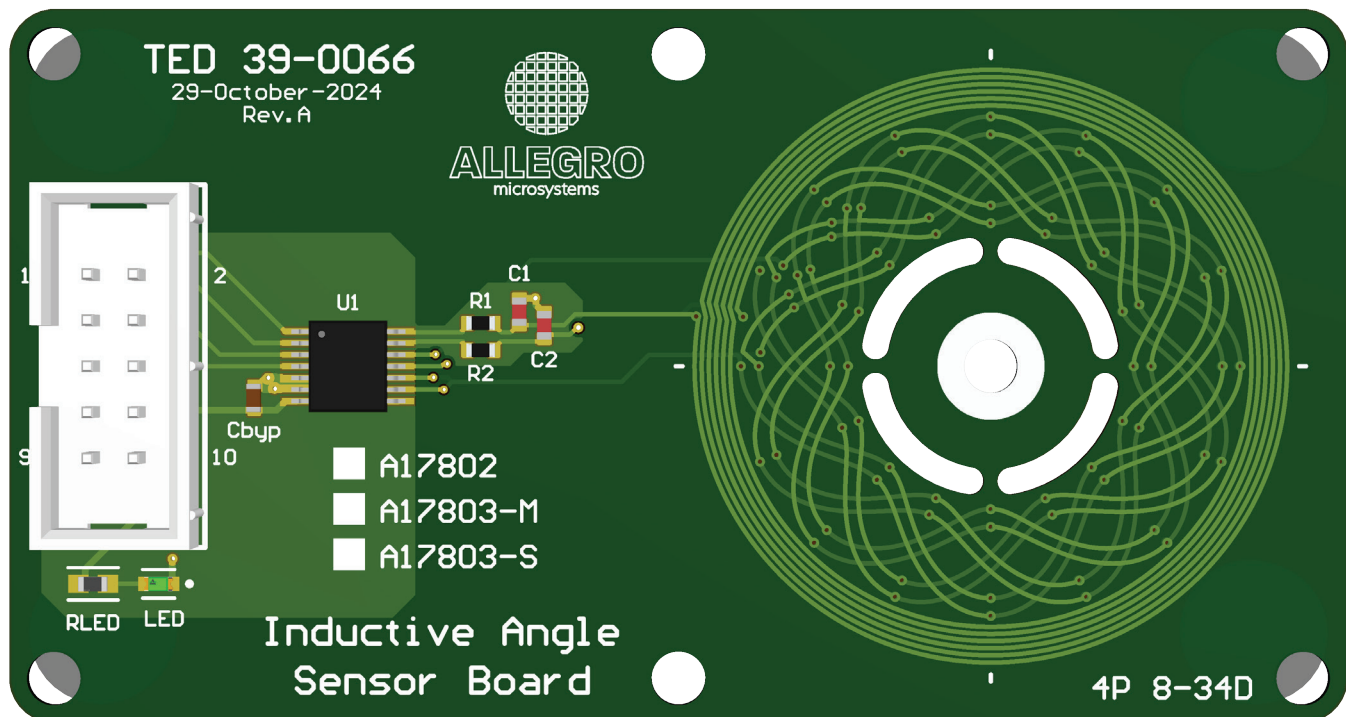
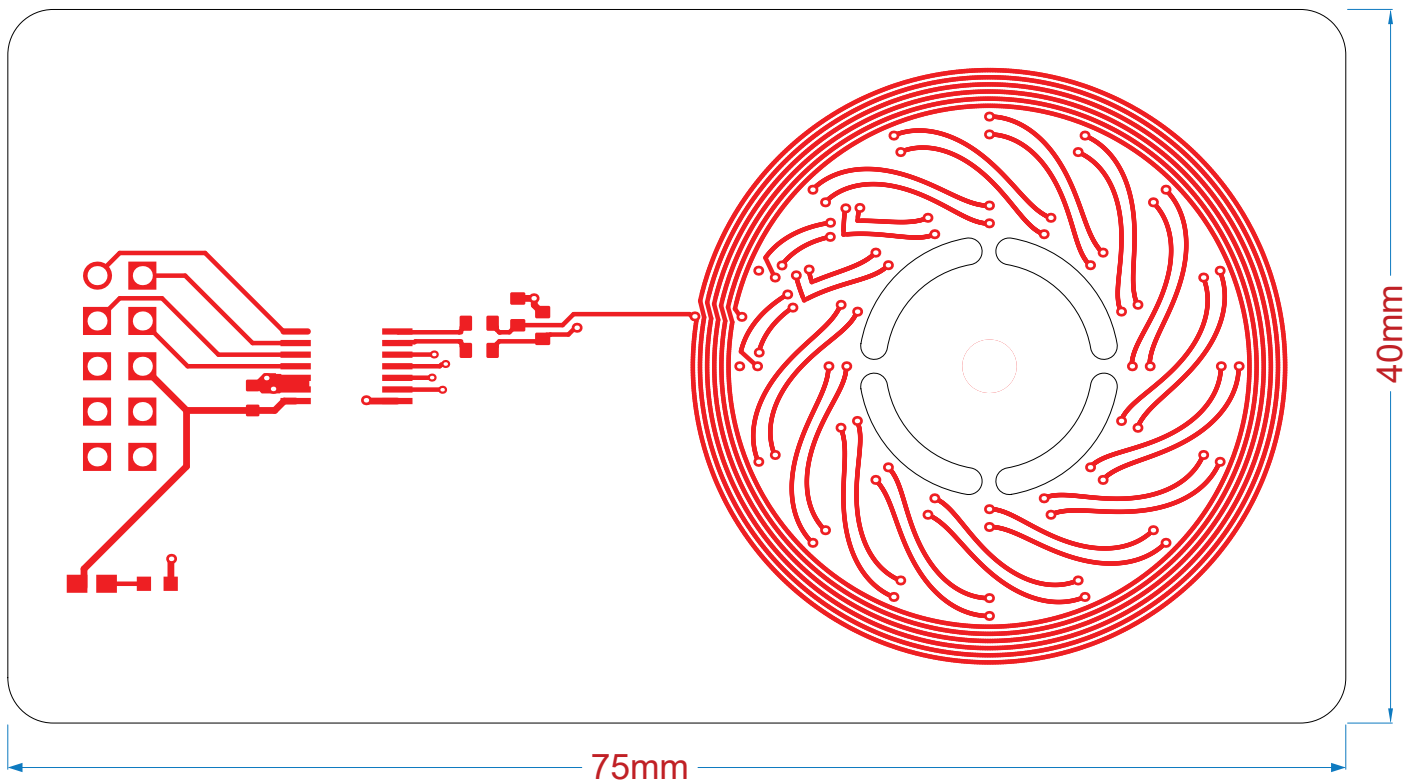


LAYOUT (continued)

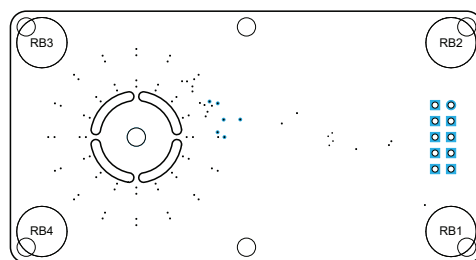
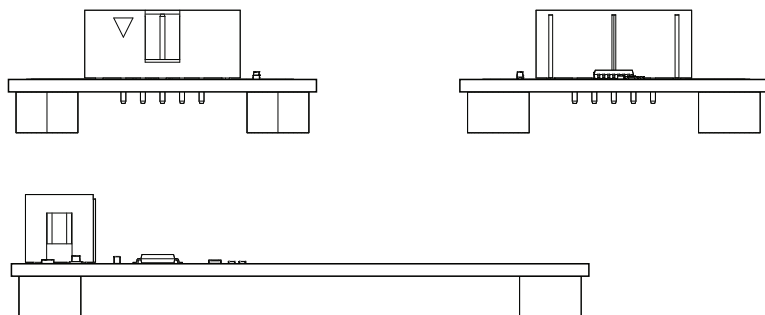
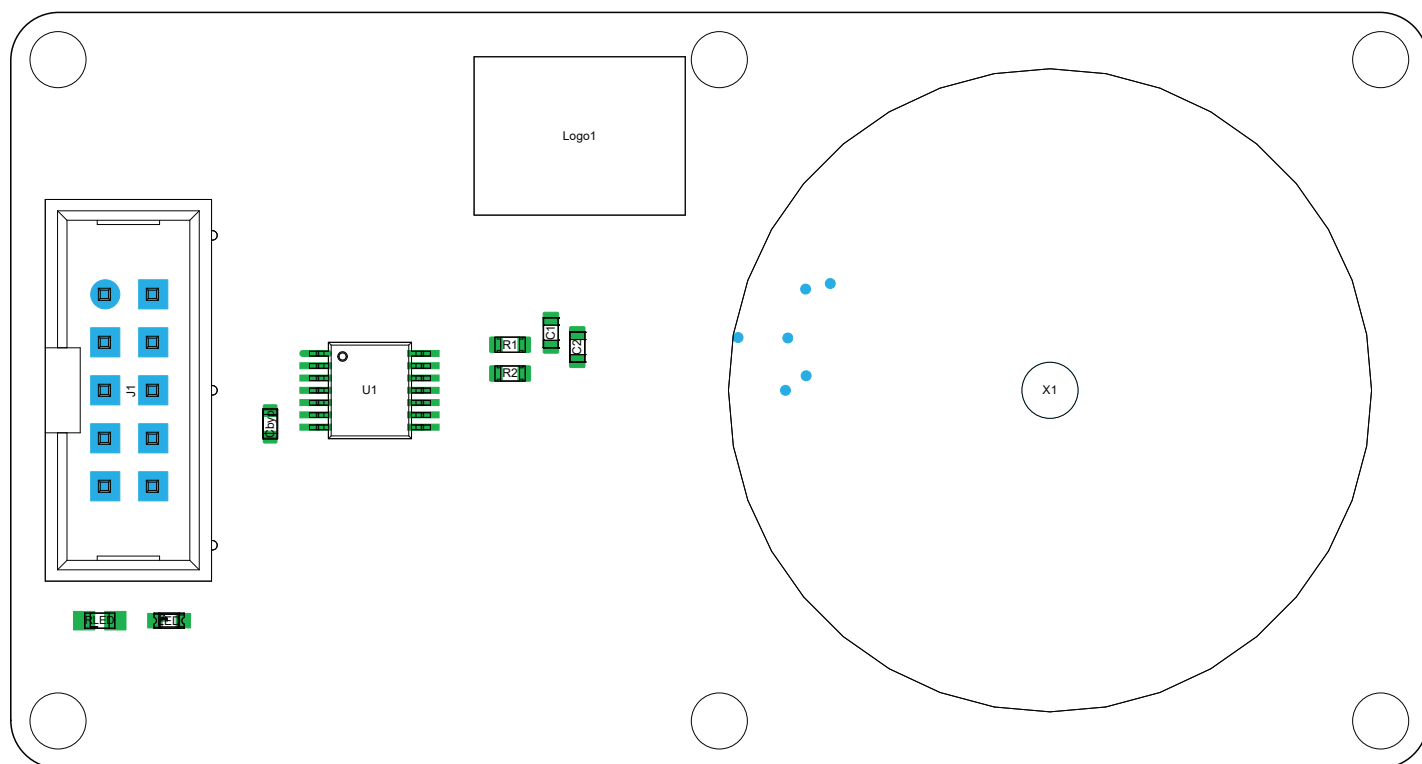
Sensor Board



LAYOUT (continued)



LAYOUT (continued)



BILL OF MATERIALS

Programmer Board

Table 1: Component Function, Specification, and Selection Criteria

Item	Quantity	Description	Designator	Manufacturer	P/N	Digikey
1	1	Translation: Voltage levels, automotive, four-channel, unidirectional	U2		TXU0304QPWRQ1	
2	1	Fixed resistor, metal glaze/thick film, 0.1 W, 4700 Ω , 75 V, $\pm 1\%$ tolerance, 100 ppm/Cel, surface mount, 0603	R9	Bourns	CR0603-FX-4701ELF	
3	1	Interconnection device	TPGND	Keystone Electronics	36-5011-ND	
4	1	74 V HC series, 5 V, surface mount, 3-state octal bus, transceiver TSSOP-20	U5	NXP	74VHC245PW,118	
5	1	Connection header, vertical, 2-position	J1	Sullins	PREC001DAAN-RC	
6	1	Multiplexer/Demultiplexer bus switch 1-element CMOS, 8-IN 16-pin TSSOP tube	U4	Texas Instruments	SN74CBT3257PW	
7	1	2-circuit IC switch 4:1 75 Ω 16-TSSOP	U3	Texas Instruments	SN74LV4052APWR	
8	1	1-circuit IC switch 2:1 15 Ω SOT-23-6	U1	Texas Instruments	SN74LVC1G3157	
9	4	Resistor, 2.1 k Ω 0603 $\pm 1\%$	R1, R2, R3, R4			
10	4	Resistor, 10 k Ω 0603	R5, R6, R7, R8			
11	4	Bumpers and leveling elements, bumper black, polyurethane adhesive mount 7.9 mm	RB1, RB2, RB3, RB4	3M	SJ61A11	
12	7	Chip capacitor, 470 nF $\pm 20\%$, 25 V, 0603, thickness 1 mm, 470 nF 0603	C1, C2, C3, C4, C5, C6, C11			
13	1	Not installed	NUCLEO_L432KC	STMicroelectronics	NUCLEO_L432KC	
14	1	Connector, through-hole, header, 1 $\times$ 15, 100 mm pitch	header1	Sullins	PPPC151LFBN-RC	S7048-ND
15	1	Connector, through-hole, header, 1 $\times$ 15, 100 mm pitch	header2	Sullins	PPPC151LFBN-RC	S7048-ND
16	1	Connector, through-hole, 2 $\times$ 5 positions, header, 100 mm pitch	J5	Sullins	SBH11-PBPC-D05-ST-BK	S9169-ND
17	5	testpoint, through-hole, for 0.062 inch PCB, any color	Pin 1, Pin 2, Pin 3, Pin 4, VCC	Keystone Electronics	5270	
18	1	PCB, as from the A17802-3 programming board Gerber files	PCB			
19	1	10-position cable assembly, rectangular, socket-to-socket, 0.500 ft. (152.40 mm, 6.00 inch)	10-position flat cable (to connect the programmer to the evaluation kit from TED 390066	Assmann WSW Components	H3DDH-1006G	H3DDH-1006G-ND

BILL OF MATERIALS (continued)

Sensor Board

Quantity	Designator	Description	Manufacturer	P/N	Digikey
1	Cbyp	Chip capacitor, 470 nF $\pm 20\%$, 25 V, 0603, thickness 1 mm	Samsung	CL10B474KO8NNNC	
1	RLED	Fixed resistor, metal glaze/thick film, 0.1 W, 4700 Ω , 75 V, $\pm 1\%$ tolerance, 100 ppm/dCel, surface mount, 0603	Bourns	CR0603-FX-4701ELF	
1	LED	LED unicolor true green 530 nm 2-pin chip 0603(1608Metric) T/R	Vishay	VLMTG1300-GS08	
2	C1, C2	0603 1.8 nF C0G (NP0) capacitor	Murata	GRM1885C1H182JA01J	
2	R1, R2	Jumper 0603	Vishay	CRCW06030000Z0EC	
4	RB1, RB2, RB3, RB4	Bumpers and leveling elements bumper black polyurethane adhesive mount 7.9 mm	3M	SJ61A11	
1	U1	IC, TSSOP-14, sensor	Allegro	A17802PLEATR	
1	J1	Connector, through, 2x5 positions, header, 100 mm pitch	Sullins	SBH11-PBPC-D05-ST-BK	S9169-ND
1	PCB	PCB per A1780x inductive angle sensor board Gerber files			
1	PCB	Programmer board			

RELATED LINKS

- A17802 product web page:
<https://www.allegromicro.com/en/products/sense/inductive-position-sensors/motor-position-sensors/a17802>
- Allegro software portal:
<https://registration.allegromicro.com/login>

APPLICATION SUPPORT

- Technical assistance:
<https://www.allegromicro.com/en/about-allegro/contact-us/technical-assistance>

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[Rev1.0](#) [EVB90371-GGO-100-Rev1.0](#) [EVB90371-GGO-300-Rev1.0](#) [LXE3302AL002](#) [LXE3302AR001](#) [LXK3301AL003](#) [LXK3302AR001](#)
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[RTKA2P3226S00000BE](#) [RTKA2P3226S00L00BE](#) [RTKA2P4200S00000BE](#) [RTKA2P4500S00000BE](#)