

Evaluating the ADE9430 High Performance, Polyphase Energy, and Class S Power Quality Monitoring IC

FEATURES

- ▶ Energy and Class S power quality measurement evaluation board with [ADE9430](#) multiphase energy and power quality monitoring IC
- ▶ 3-phase 4-wire, 3-phase 3-wire, or 3-wire single-phase measurements
- ▶ Direct interface with current output current transformers
- ▶ Up to 240 V rms nominal line neutral voltage measurement
- ▶ For use with the ADSW-PQ-CLS Power Quality Library

EVALUATION KIT CONTENTS

- ▶ STM32 NUCLEO-F413ZH
- ▶ EVAL-ADE9430ARDZ evaluation board
- ▶ Current transformers

ADDITIONAL EQUIPMENT AND SOFTWARE NEEDED

- ▶ Micro USB cable
- ▶ Voltage channel interconnects
- ▶ ADSW-PQ-CLS Power Quality Library

DOCUMENTS NEEDED

- ▶ ADE9430 data sheet
- ▶ ADSW-PQ-CLS Power Quality Library User Guide

ONLINE RESOURCES

- ▶ [Schematics, Layout, and Bill of Materials](#)

GENERAL DESCRIPTION

The EVAL-ADE9430ARDZ is for use with the STM32 NUCLEO-F413ZH. The EVAL-ADE9430ARDZ can be directly interfaced with current transformers and voltage leads. The EVAL-ADE9430ARDZ enables quick evaluation and prototyping of energy and Class S power quality measurement systems with the ADE9430. The ADSW-PQ-CLS Power Quality Library and application examples are provided to simplify implementation of larger systems. To request access to the ADSW-PQ-CLS, fill out the software request form at: [Software Request Form | Analog Devices](#), where the target technology must be power quality monitoring and the processor/system on chip (SoC) is the ADE9430.

HAZARDOUS HIGH VOLTAGE

This equipment is connected to hazardous line voltages. Exercise proper caution when connecting the sensors and voltage leads. Ensure that the system is enclosed in a protective casing.

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REVISION HISTORY

8/2025—Rev. A to Rev. B	
Added Online Resources Section.....	1
Deleted Ordering Information Section, Bill of Materials Section, and Table 2.....	7
1/2024—Rev. 0 to Rev. A	
Changes to Figure 9.....	8
Changes to Table 2.....	8
5/2022—Revision 0: Initial Version	

EVAL-ADE9430ARDZ CONNECTION DIAGRAM

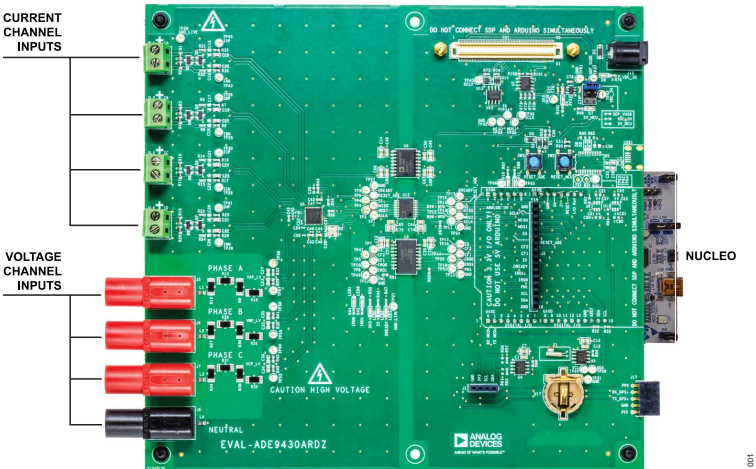


Figure 1. EVAL-ADE9430ARDZ Connection Diagram

MODULE HARDWARE

CURRENT SENSORS

The EVAL-ADE9430ARDZ is designed to work directly with the provided current output current transformers (CTs). Connect the CT leads to the SL1, SL2, SL3, and SL4 terminal blocks.

Current Output CTs

The EVAL-ADE9430ARDZ has on-board burden resistors in the differential configuration to allow direct connection with current output CTs. With a typical 2500:1 CT, the maximum recommended current is 86 A rms. Refer to the [ADE9430](#) data sheet to modify burden resistors for different current ranges.

Voltage Output CTs

To use voltage output CTs, remove the R1, R2, R3, R4, R10, R11, R19, and R20 burden resistors. The maximum recommended CT output voltage is ± 0.353 V rms.

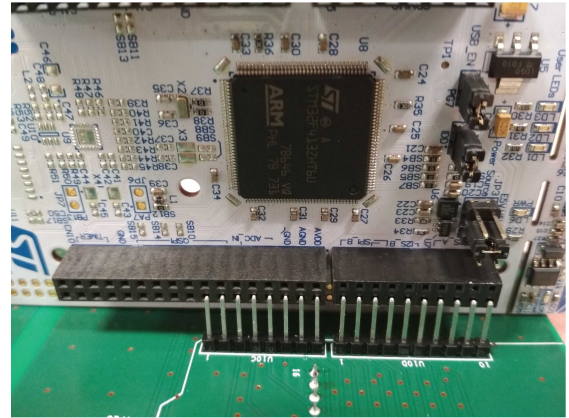
VOLTAGE SENSORS

The EVAL-ADE9430ARDZ has on-board resistor dividers to attenuate the incoming input voltage. The attenuation factor is 801. Do not exceed the 240 V rms nominal line to neutral voltage in the 3-phase, 4-wire (3P4W) wye configuration. In the 3-wire delta configuration, when Phase B is used as the reference, do not exceed 250 V rms line to line voltage. There are 4 mm banana jacks on board to connect the voltage inputs. Use TPI A079 or equivalent leads with alligator clips to connect the voltage inputs.

POWERING THE EVAL-ADE9430ARDZ

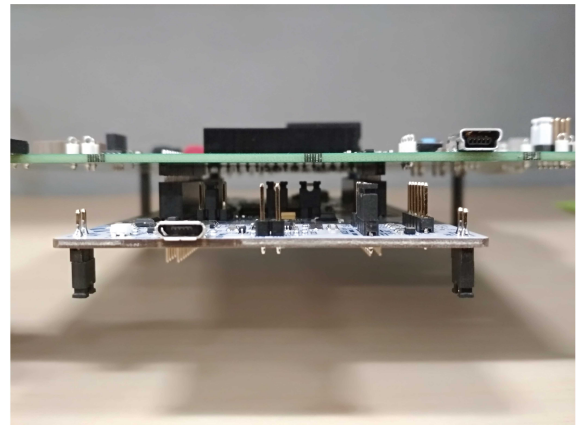
To power the EVAL-ADE9430ARDZ, users have two options: use a barrel power jack or the USB cable coming from the STM32 NUCLEO-F413ZH. Take the following steps to power up the EVAL-ADE9430ARDZ:

1. Remove the EVAL-ADE9430ARDZ and STM32 NUCLEO-F413ZH from their packaging.
2. Plug the STM32 NUCLEO-F413ZH into the EVAL-ADE9430ARDZ using the Arduino® UNO headers on the EVAL-ADE9430ARDZ.



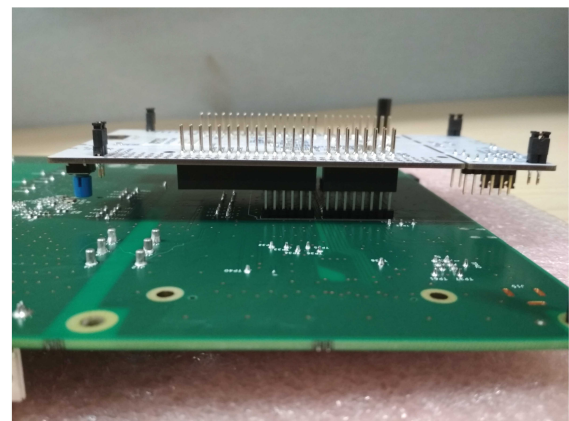
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Figure 2. EVAL-ADE9430ARDZ to NUCLEO Pin Alignment, Align the U10 Header with the Row Farthest from the STM32 Microcontroller on the NUCLEO-F413ZH Board (U8 on the PCB)



003

Figure 3. EVAL-ADE9430ARDZ to STM32 NUCLEO-F413ZH Pin Alignment, Align the U10 Header with the Connectors on Each Side



004

Figure 4. The EVAL-ADE9430ARDZ and STM32 NUCLEO-F413ZH Mated Completely

3. Then, select one of the two power-up options that follow:

MODULE HARDWARE

- a. Power the EVAL-ADE9430ARDZ by using the J15, 5.1 mm barrel connector. However, do not apply more than 12 V dc, and place a jumper on J2 and set it to the middle position.

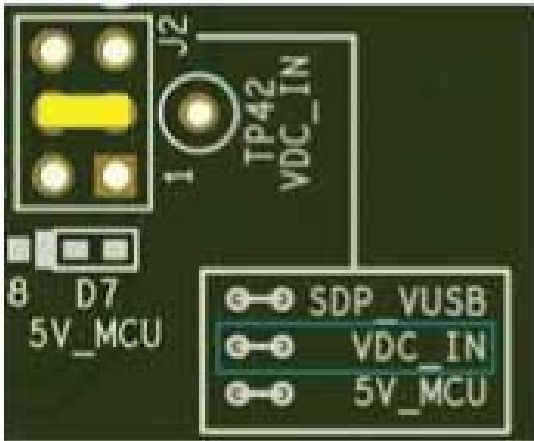


Figure 5. Jumper Position for External Power Jack

- b. Power the EVAL-ADE9430ARDZ through the USB cable connected to the STM32 NUCLEO-F413ZH, and place a jumper on J2 in the position next to D7.

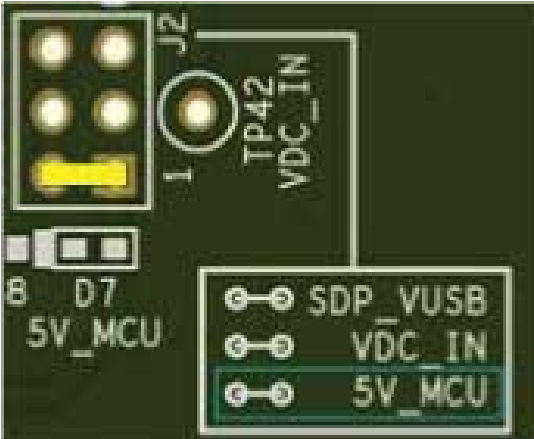


Figure 6. Jumper Position for STM32 NUCLEO-F413ZH Power

- 4. Securely screw the leads of the provided CTs to the current inputs (SL1, SL2, SL3, and SL4).
- 5. Connect the voltage terminals to the J5, J6, J7, and J8 connectors.
- 6. After setting the power jumper, plug the STM32 NUCLEO-F413ZH into the PC via the USB port.
- 7. Program the example from the PQLib software. Refer to the ADSW-PQ-CLS Power Quality Library User Guide for this software information. To request access to the ADSW-PQ-CLS, fill out the software request form at: [Software Request Form | Analog Devices](#), where the target technology must be power quality monitoring and the processor/system on chip (SoC) is the ADE9430.
- 8. Configure the serial port to talk to the PQLib via the command line interface (CLI), if applicable.

COMPONENTS

Table 1 lists the required voltage leads and clips that can connect voltages and external current sensors to the EVAL-ADE9430ARDZ. These leads and clips are not provided with the EVAL-ADE9430ARDZ but equivalent components can also be used.

Table 1. Required Voltage Leads and Clips

Manufacturer	Part No.
Leads	
Test Products International	A079
Clips	
Test Products International	A058
Ponoma Electronics	6041B

LINE VOLTAGE CONNECTIONS

The EVAL-ADE9430ARDZ is connected to hazardous line voltages. Exercise proper caution when connecting the sensors and voltage leads. Ensure that the system is enclosed in a protective casing.

3-PHASE, 4-WIRE (3P4W) WYE

The 3P4W wye connection is shown in [Figure 7](#). Do not exceed the nominal voltage of a 240 V rms line to neutral in the wye configuration.

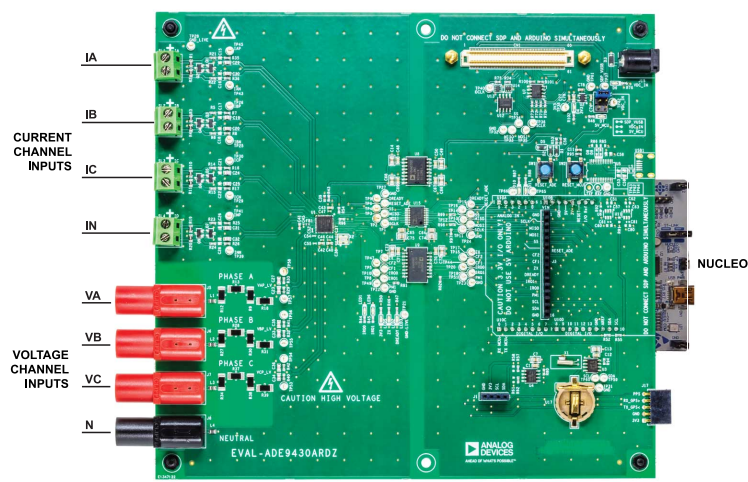


Figure 7. 3P4W Wye Connection

LINE VOLTAGE CONNECTIONS

3-PHASE, 3-WIRE (3P3W) DELTA

The 3P3W delta connection is shown in [Figure 8](#). Phase B is used as the reference. Therefore, the neutral channel on the EVAL-ADE9430ARDZ is connected to Phase B. Do not exceed the 250 V rms line to line voltage in the delta configuration.

Set VCONSEL and ICONSEL to the following values to correctly set the ADE9430 for the 3P3W connection:

- Set VCONSEL to 001 so that $V_B = V_A - V_C$.
- Set ICONSEL to 1 so that $I_B = -I_A - I_C$.

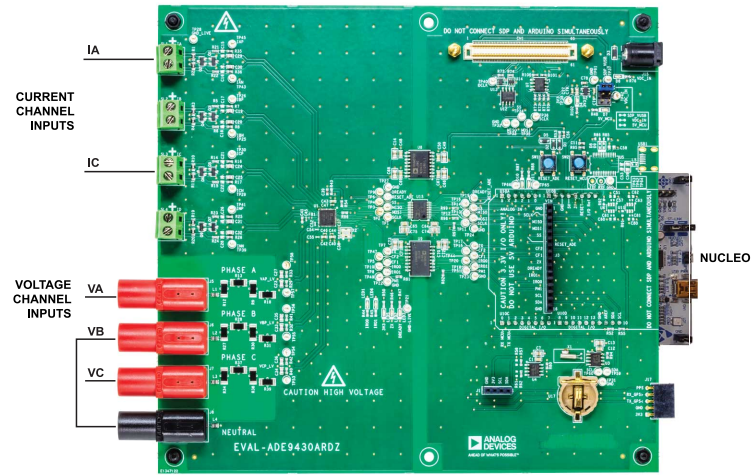


Figure 8. 3P3W Delta Connection

NOTES

**ESD Caution**

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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