Evaluating the ADEMA124/ADEMA127 Simultaneously Sampling 4- and 7-Channel ΣΔ ADC with SPI

FEATURES

- Fully-featured evaluation board for the ADEMA124 and ADEMA127
- 3-phase 4-wire, 3-phase 3-wire, or 3-wire single-phase measurements
- PC control in conjunction with the Analysis | Control | Evaluation (ACE) system demonstration platform
- Up to 240V$_{rms}$ nominal line neutral voltage measurement

EVALUATION KIT CONTENTS

- 2 board EVAL-ADEMA127KTZ evaluation kit
- Current transformers

EQUIPMENT NEEDED

- PC with USB 2.0 port, recommended
- USB Micro B cable

DOCUMENTS NEEDED

- ADEMA124/ADEMA127 data sheet

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.

GENERAL DESCRIPTION

The EVAL-ADEMA127KTZ is a two board evaluation kit for the simultaneously sampling 4-channel ADEMA124 and 7-channel ADEMA127 ΣΔ ADC. The EVAL-ADEMA127KTZ evaluation board is a configured as a 3-phase meter. The kit includes current transformers (CTs) for A-, B-, and C-phase and neutral current measurement. The application MCU board includes the STM32H573. The kit can be interfaced with via GUI available in the ACE software environment. The ADC driver library for the ADEMA124/ADEMA127 available on GitHub can also be uploaded to the application MCU board.

Full specifications on the ADEMA124/ADEMA127 are available in the ADEMA124/ADEMA127 data sheet available from Analog Devices, Inc. and must be consulted with this user guide when using the EVAL-ADEMA127KTZ evaluation board.

For the current schematic, printed circuit board (PCB), and bill of material (BOM), refer to the EVAL-ADEMA127 product page.

PLEASE SEE THE LAST PAGE FOR AN IMPORTANT WARNING AND LEGAL TERMS AND CONDITIONS.

Rev. 0 | 1 of 7

TABLE OF CONTENTS

REVISION HISTORY

7/2025—Revision 0: Initial Version

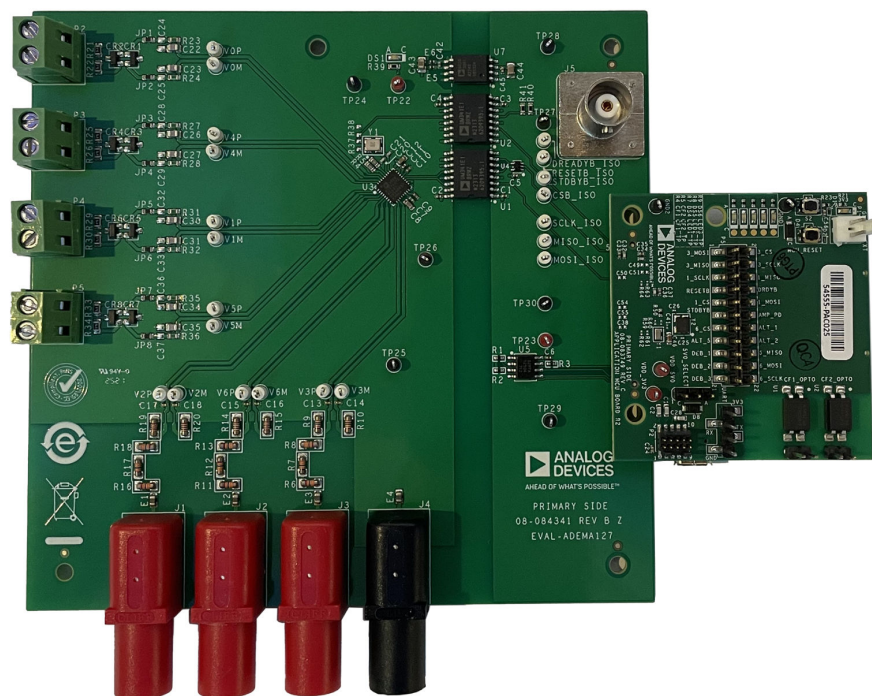## EVAL-ADEMA127KTZ EVALUATION BOARD PHOTOGRAPH

Figure 1. EVAL-ADEMA127KTZ Evaluation Board Photograph

EVALUATION BOARD HARDWARE

CURRENT SENSORS

The EVAL-ADEMA127KTZ is designed to work directly with the provided current output CTs. Connect the CT leads to the P2, P3, P4, and P5 terminal blocks.

The EVAL-ADEMA127KTZ has on-board burden resistors in the differential configuration to allow direct connection with current output CTs. The burden resistors may be modified for different current ranges.

VOLTAGE SENSORS

The EVAL-ADEMA127KTZ has on-board resistor dividers to attenuate the incoming input voltage. Do not exceed the 240V_{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 250V_{rms} line-to-line voltage.

There are 4mm 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-ADEMA127KTZ

The EVAL-ADEMA127KTZ is powered by default via USB through the P7 micro-USB port. Power is distributed through the application MCU board to the daughter board below.

The EVAL-ADEMA127KTZ may alternatively be powered via 6V to 15V supply via P1 connector. The position of the jumper on the 5V0_SELECT connector must also be adjusted.

EVALUATION BOARD SOFTWARE

The evaluation board is compatible with ACE software.

The EVAL-ADEMA127KTZ used the CP2102N-A02 USB-to-UART bridge for communication with the Windows® PC. Download and install the CP2102N-A02 driver from the Silicon Labs website.

Once the Silicon Labs drivers are installed, plug in the EVAL-ADEMA127KTZ and open **Device Manager** on the PC. Note the COM number assigned to the Silicon Labs CP210x USB-to-UART Bridge. The example shown in Figure 2 is assigned to COM5.

Install the ACE software from here.

Install the Chip.ADEMA127 package from the **ADC Plug-In Manager**.

Once installation completes, configure the EVAL-ADEMA127KTZ. From the ACE **Home** tab, click **Add Hardware**. The EVAL-ADEMA127KTZ is configured as a serial ports. The **Number** field is the COM port number attained from the Windows **Device Manager** for the Silicon Labs CP210x USB-to-UART Bridge. The required **Baudrate** is 921600, the **Buffer Size** 64, and the **Protocol** is IIO, as shown in Figure 3.
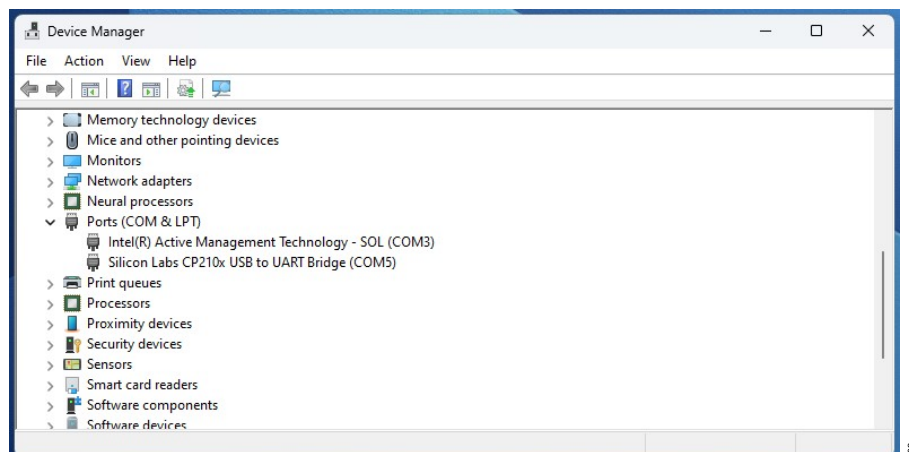
Figure 2. Device Manager
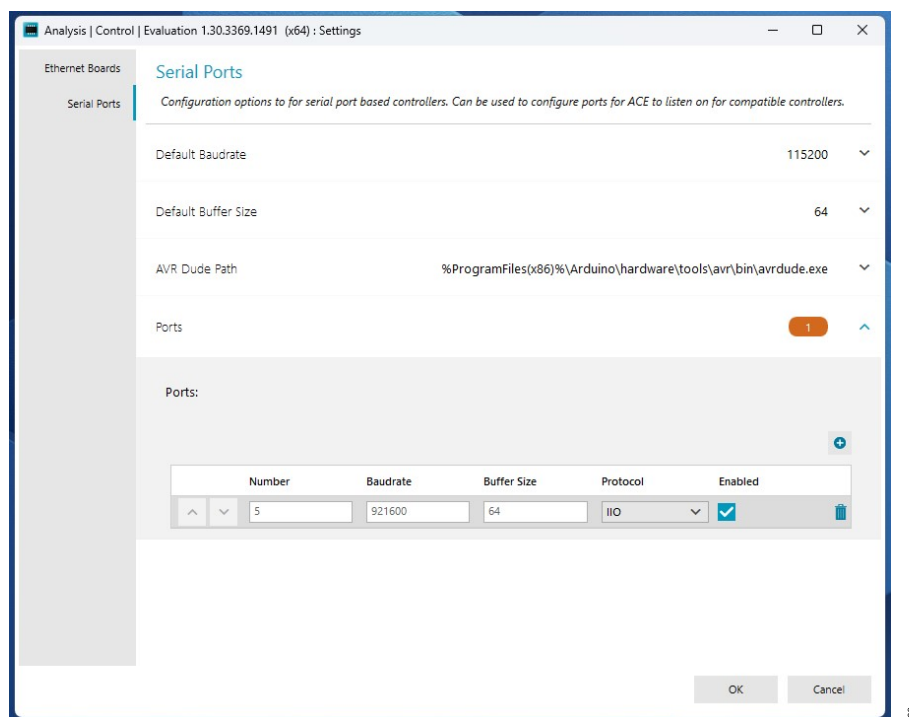
Figure 3. ACE Configuration of EVAL-ADEMA127KTZ

EVALUATION BOARD SOFTWARE

ADC SERVICE

For more details on the ADC drivers for the ADEMA124/ADEMA127 and specific information related the applications MCU board, refer to the App MCU Board: Build and Run Instructions.

GETTING STARTED

For instructions on getting started with both the EVAL-ADE-MA127KTZ evaluation kit and the ACE software plug-in, refer to the ADEMA127 ACE Plug-In User's Guide.

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.