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EVAL-SPoE-KIT-AZ Evaluation Kit User Guide

General Description

The EVAL-SPoE-KIT-AZ is an IEEE 802.3cg single-pair, power over Ethernet (SPoE) evaluation kit. The kit features the LTC4296-1, 5-Port SPoE power sourcing equipment (PSE) controller, and the LTC9111, SPoE powered device (PD) for evaluation of IEEE 802.3cg Class 10 through 15 SPoE power. The ADIN1100, 10BASE-T1L PHY (Ethernet PHYceiver) provides the Ethernet data in the system.

Power + Data Evaluation

The EVAL-SPoE-KIT-AZ provides evaluation of 10BASE-T1L data and SPoE power over a single twisted pair Ethernet (SPE) cable. Connect the EVAL-LTC9111-AZ to the EVAL-LTC4296-1-KIT-AZ with the provided SPE cable. Connect a 10BASE-T compatible data source with a CATV Ethernet cable to the EVAL-LTC4296-1-KIT-AZ. Connect a 10BASE-T compatible end device with a CATV Ethernet cable to the EVAL-LTC9111-AZ. (Note the end device will need power from an auxiliary source.)
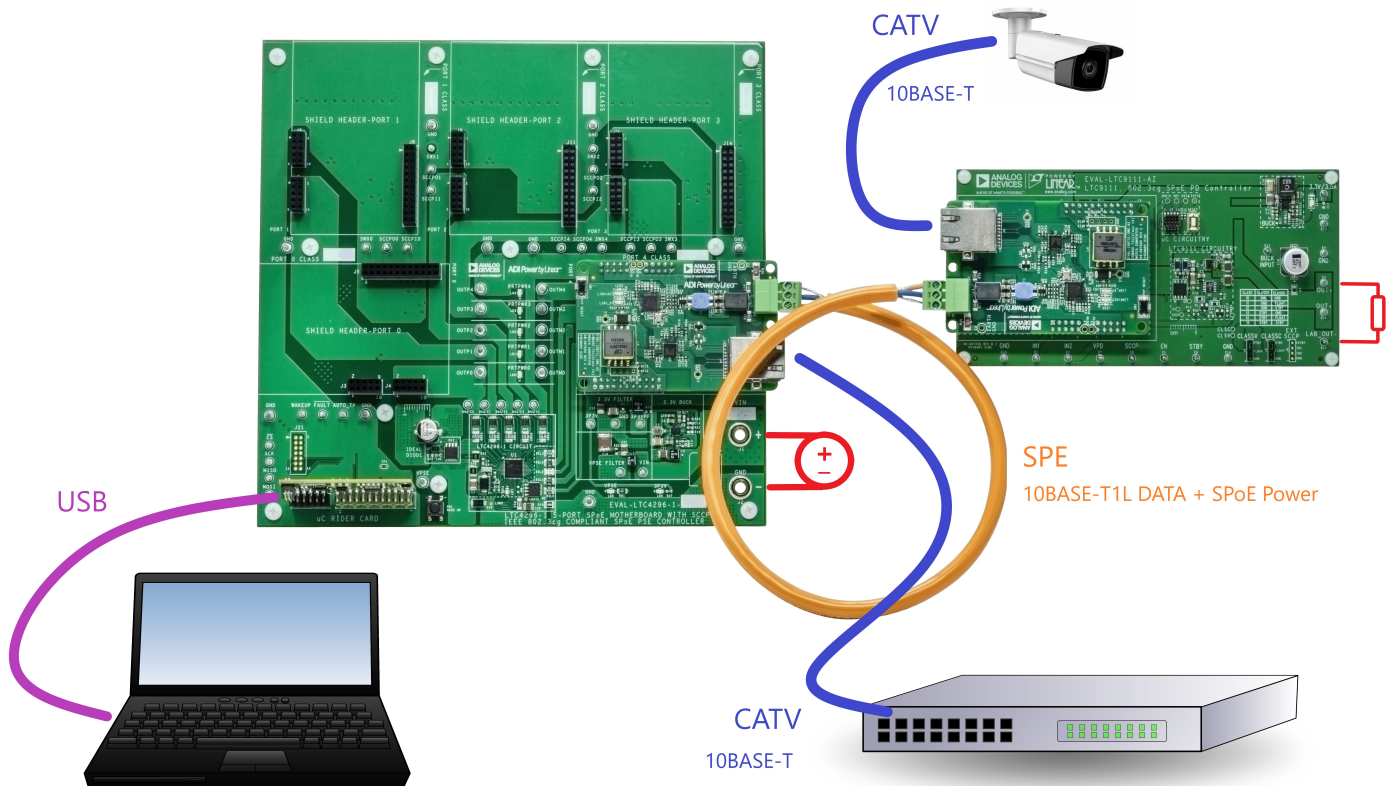

Figure 1. 10BASE-T1L data and SPoE power evaluation with the EVAL-SPoE-KIT-AZ.

Kit Contents

- (1) EVAL-LTC4296-1-KIT-AZ
    - EVAL-LTC4296-1-AZ PSE Motherboard
    - EVAL-LTC4296-1-RC-AZ Microcontroller Rider Card
    - Micro B USB (Universal Serial Bus) Cable
- (1) EVAL-LTC9111-AZ PD Motherboard
- (2) EVAL-10BT1L-SMC-AZ ADIN1100 Media Converter Class 10 through 14 SPoE Shield
- (2) EVAL-10BT1L-SMC-BZ ADIN1100 Media Converter Class 15 SPoE Shield
- (1) 12", Single Twisted Pair, 18AWG, Cable
- (1) Micro-B USB (Universal Serial Bus) Cable (not shown)

Figure 2. EVAL-SPoE-KIT-AZ 802.3cg SPoE Class 10 through 15 and 10BASE-T1L SPE evaluation kit.

EVAL-LTC4296-1-KIT-AZ Setup

The EVAL-LTC4296-1-KIT-AZ is comprised of the EVAL-LTC4296-1-AZ PSE motherboard, EVAL-LTC4296-1-RC-AZ microcontroller rider card, and a micro-B USB (Universal Serial Bus) cable. The LTC4296-1 GUI (Graphical User Interface) communicates with the EVAL-LTC4296-1-KIT-AZ for user interaction.
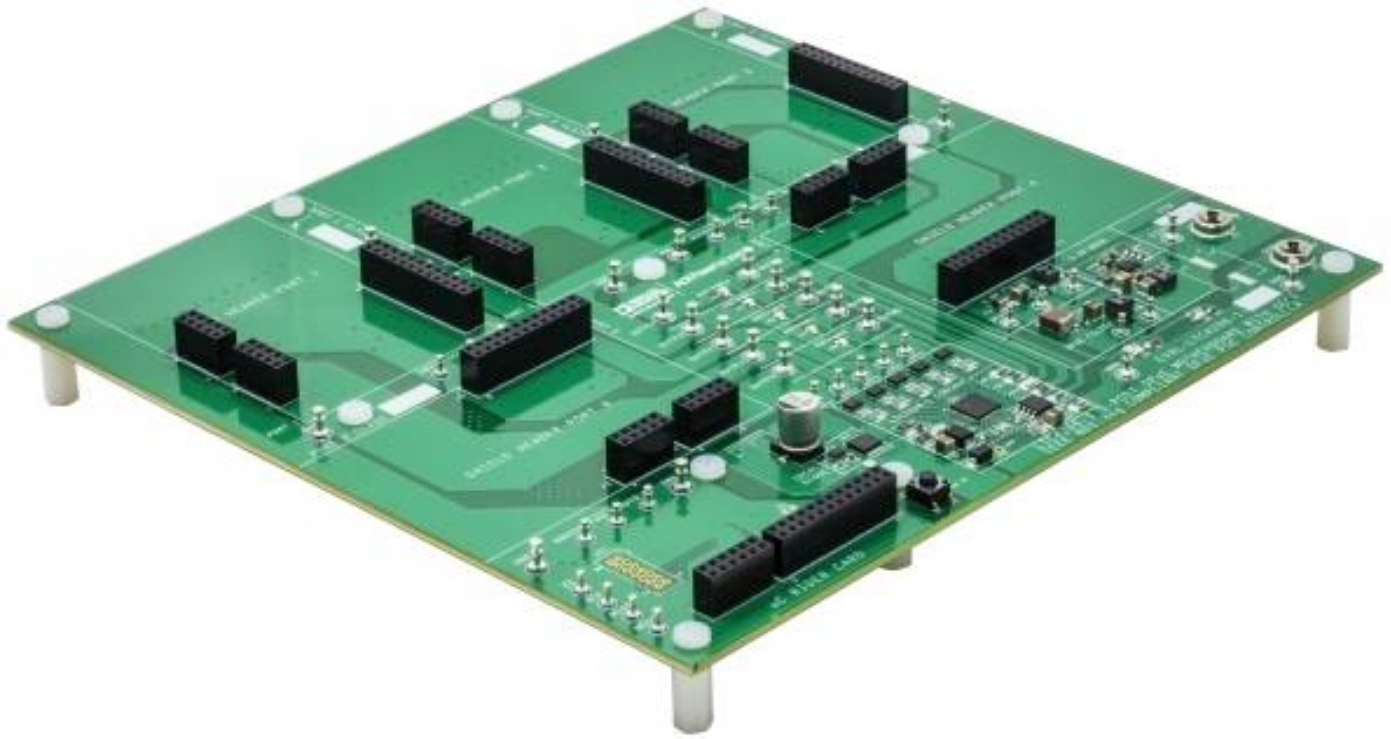
Figure 3. EVAL-LTC4296-1-AZ PSE motherboard.

Figure 4. EVAL-LTC4296-1-RC-AZ microcontroller rider card.

Rider Card Installation

Align the EVAL-LTC4296-1-RC-AZ rider card male headers with the female headers on the EVAL-LTC4296-1-AZ motherboard labeled for the μC RIDER CARD. Insert the card to where the headers are flush. Before proceeding, verify no pins are sticking out indicating a misalignment. Powering the motherboard with a misaligned card can cause damage to the system.
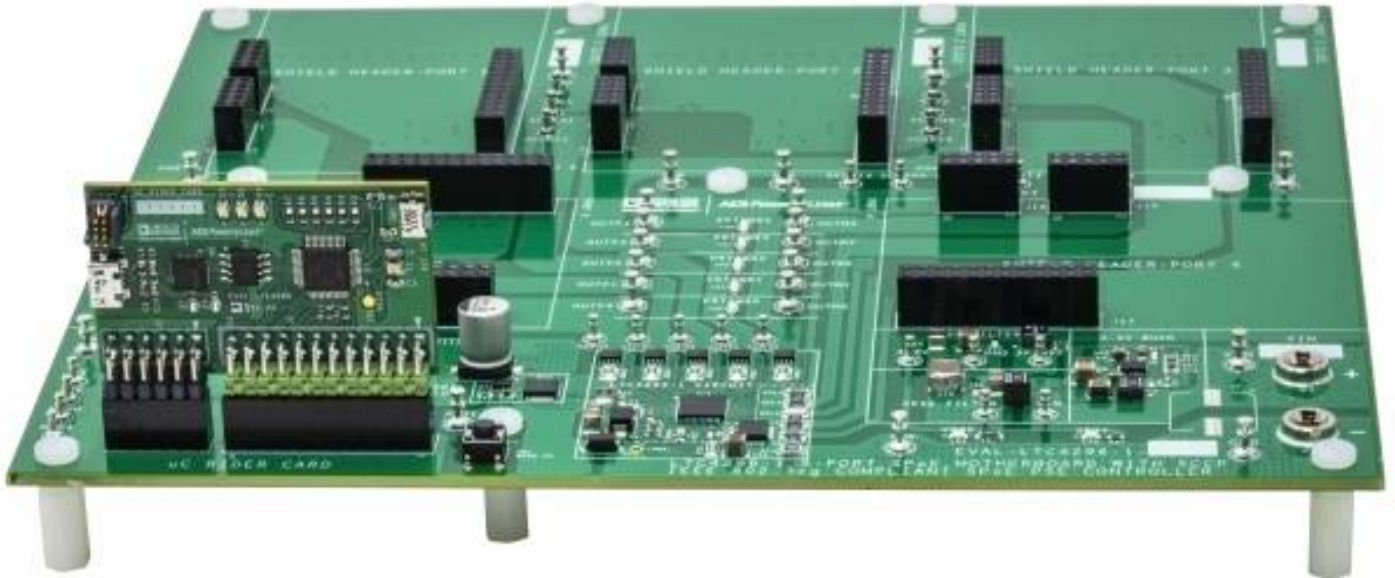
Figure 5. EVAL-LTC4296-1-KIT-AZ (EVAL-LTC4296-1-AZ motherboard and installed EVAL-LTC4296-1-RC-AZ microcontroller rider card.

Shield Installation

The EVAL-LTC4296-1-AZ PSE motherboard can accept up to 5 media converter shields at locations Port 0 through 4. The sense resistors for each port have been pre-selected for evaluation of specific maximum classes with respect to the power supply voltage.

The EVAL-10BT1L-SMC-AZ is a 10BASE-TX to 10BASE-T1L media converter shield with a power coupling network suited for Class 10 through 14 power levels. On the default configured motherboard, the EVAL-10BT1L-SMC-AZ should be inserted at Port 0, Port 1, Port 2, or Port 4. These positions are shown in red in the picture below. See Table 1 and Figure 6.

The EVAL-10BT1L-SMC-BZ is a 10BASE-TX to 10BASE-T1L media converter shield with a power coupling network suited for the Class 15 power level. On the default configured motherboard, the EVAL-10BT1L-SMC-BZ should be inserted at Port 3 only. This position is shown in orange in the picture below. See Table 1 and Figure 6.

When inserting a shield on to the motherboard, align the shield's two short male headers with the two short female headers at a port on the motherboard. The longer header will naturally align. Note, the last two pins of the longer header on the mother board are reserved for future use and will not have pins inserted in them. Insert the shield to where the headers are flush. Before proceeding, verify no pins are sticking out indicating a misalignment. Powering the motherboard with a misaligned shield can cause damage to the system.

Table 1. EVAL-LTC4296-1-AZ Board Default Port Class Configuration

PORT	PORT CONFIGURED CURRENT LIMIT	MAX CLASS (VIN = 24V)	MAX CLASS (VIN = 52V)	SHIELD
0	0.116A	10	N/A	EVAL-LTC4296-1-AZ
1	0.300A	11	13	EVAL-LTC4296-1-AZ
2	0.775A	12	14	EVAL-LTC4296-1-AZ
3	1.860A	N/A	15	EVAL-LTC4296-1-BZ

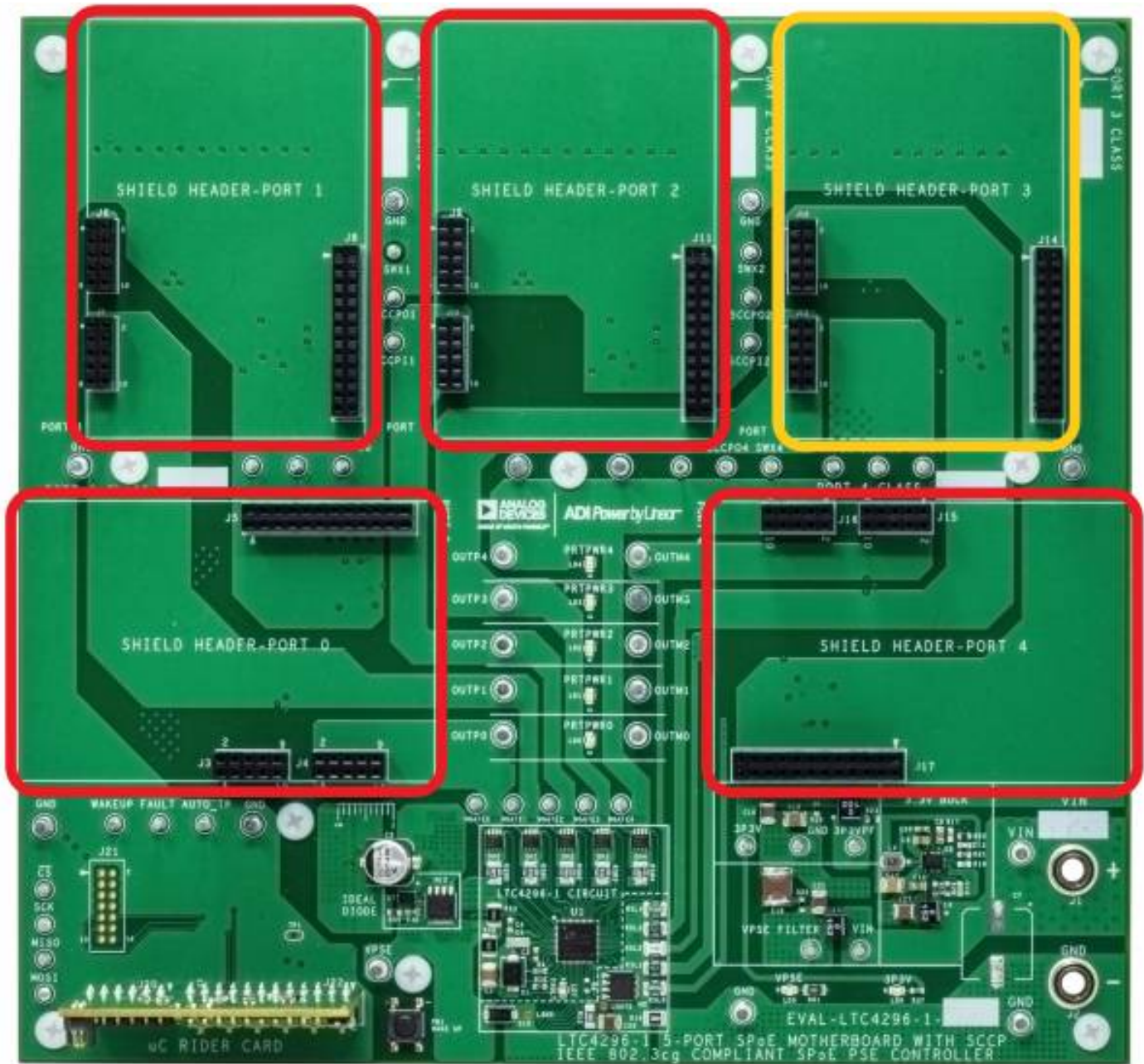| PORT	PORT CONFIGURED CURRENT LIMIT	MAX CLASS (VIN = 24V)	MAX CLASS (VIN = 52V)	SHIELD
4	0.775A	12	14	EVAL-LTC4296-1-AZ

Figure 6. EVAL-LTC4296-1-KIT-AZ port shield placements.

Power Supply

Note: Before turning on the power supply, verify all shields and rider card are properly aligned with their respective headers on the motherboard and the connector pins are fully inserted.

Connect a bench power supply across the VIN (+) and GND (-) banana terminals on the EVAL-LTC4296-1-AZ motherboard. The voltage of the power supply sets the SPoE voltage. For evaluation of Class 10 through 12, set the nominal voltage to 24V; for evaluation of Class 13 through 15 set the nominal voltage to 52V. Set the current limit of the power supply higher than the current limit of the port under test, or the sum of the current limits for multiple port evaluation.

The EVAL-LTC4296-1-AZ motherboard has an onboard stepdown DC/DC converter that generates 3.3V to power the rider card and the shield cards.
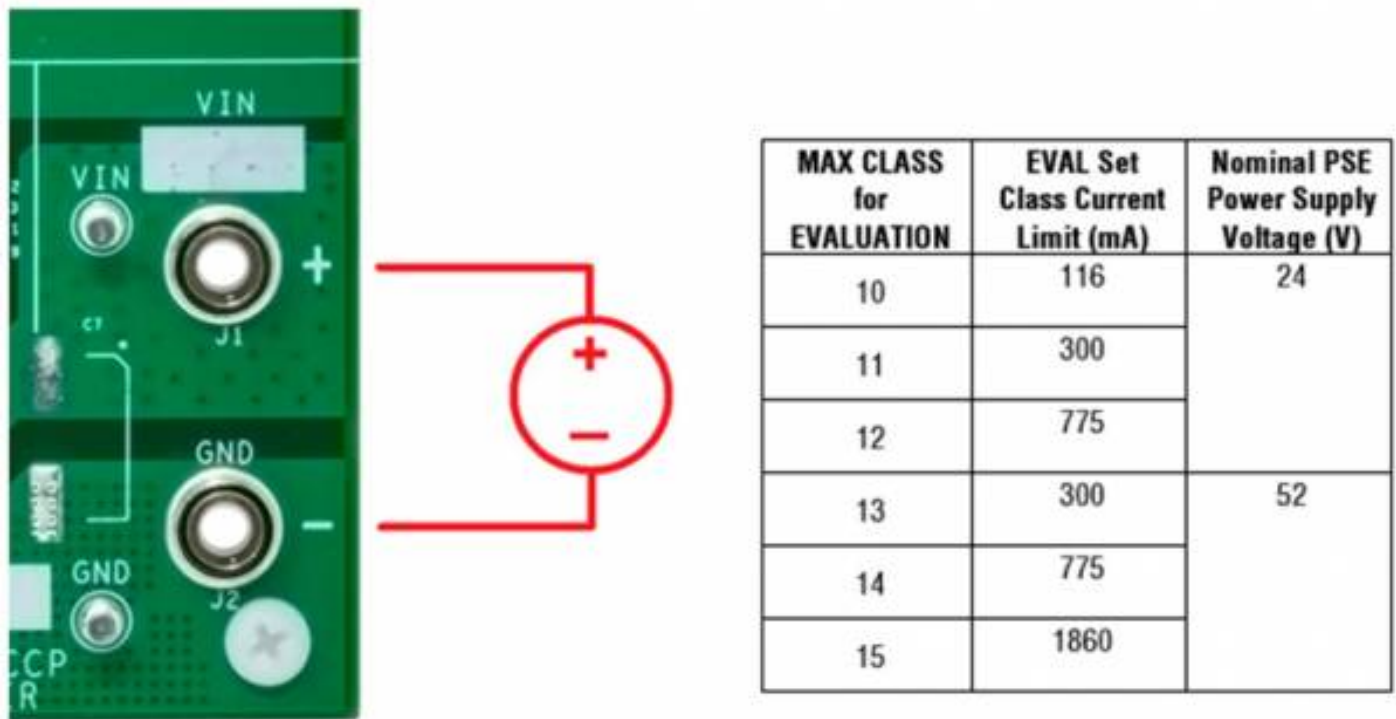

MAX CLASS for EVALUATION	EVAL Set Class Current Limit (mA)	Nominal PSE Power Supply Voltage (V)
10	116	24
11	300	
12	775	
13	300	52
14	775	
15	1860	

Figure 7. EVAL-LTC4296-1-KIT-AZ power supply connection and settings.

GUI Setup

The LTC4296-1 Graphical User Interface (GUI (Graphical User Interface)) provides the user with basic status and configuration of the PSE ports. Use the micro-B USB (Universal Serial Bus) cable to connect a PC to the powered EVAL-LTC4296-1-KIT-AZ at the EVAL-LTC4296-1-RC-AZ rider card micro-USB (Universal Serial Bus) female connector. Open the LTC4296-1 GUI (Graphical User Interface) and the condensed GUI (Graphical User Interface) display will open if successful. If an error occurs when opening the GUI (Graphical User Interface), verify the EVAL-LTC4296-1-KIT-AZ is powered, push the reset button on the EVAL-LTC4296-1-RC-AZ rider card and re-launch the LTC4296-1 GUI (Graphical User Interface).

On the condensed GUI (Graphical User Interface), click on Expand Details in each column for the full GUI (Graphical User Interface) display. In the Global Column, select in the Demo Board drop down menu EVAL-LTC4296-1-AZ to automatically configure each port maximum Class and Type, R_hsns and R_lsns sense resistor values, and MFVS Threshold to match the default settings on the EVAL-LTC4296-1-AZ motherboard. The ports will start in a Disabled state. To enable a port, select Power Up in the port's Classification (SCCP) section.
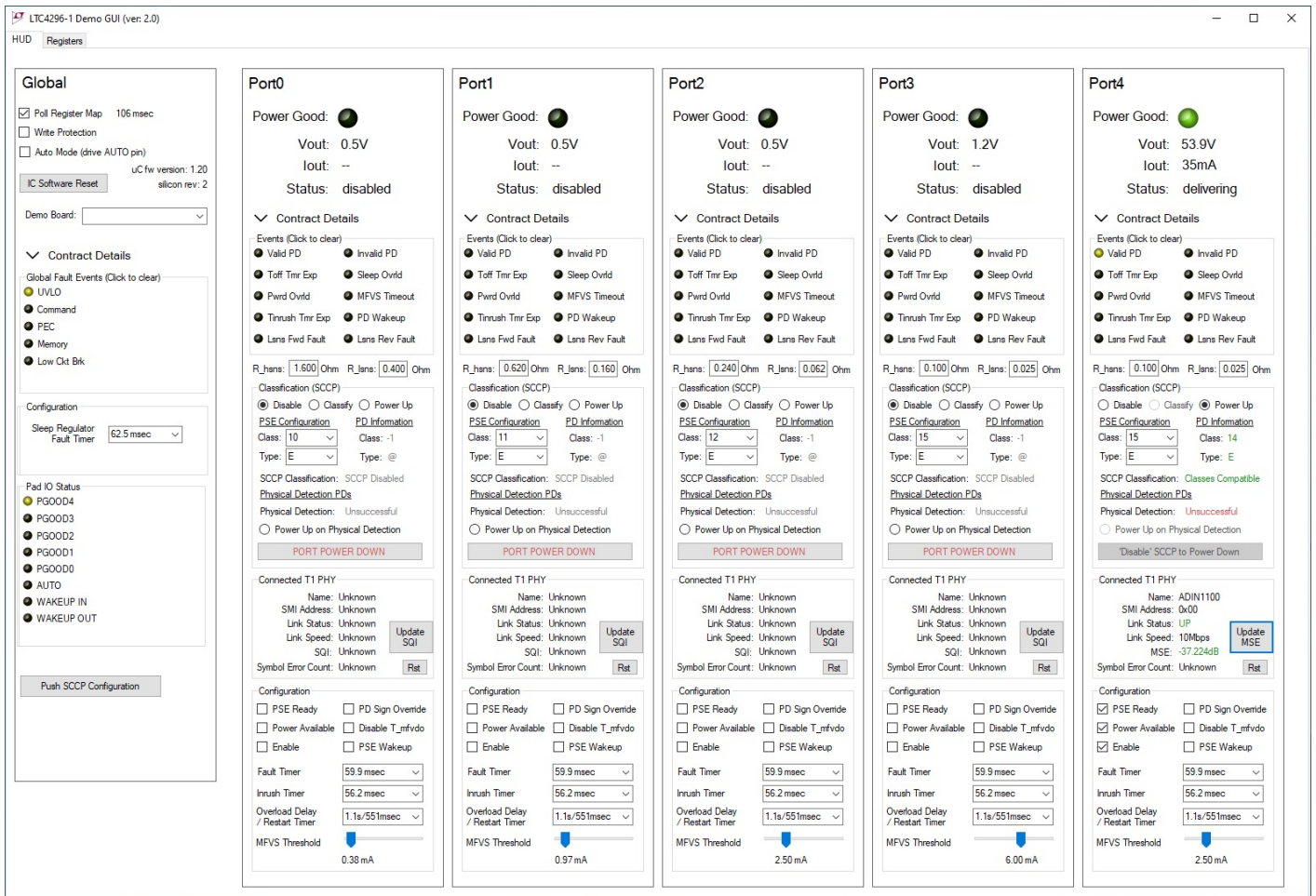
Figure 8. LTC4296-1 GUI (Graphical User Interface).

EVAL-LTC9111-AZ Setup

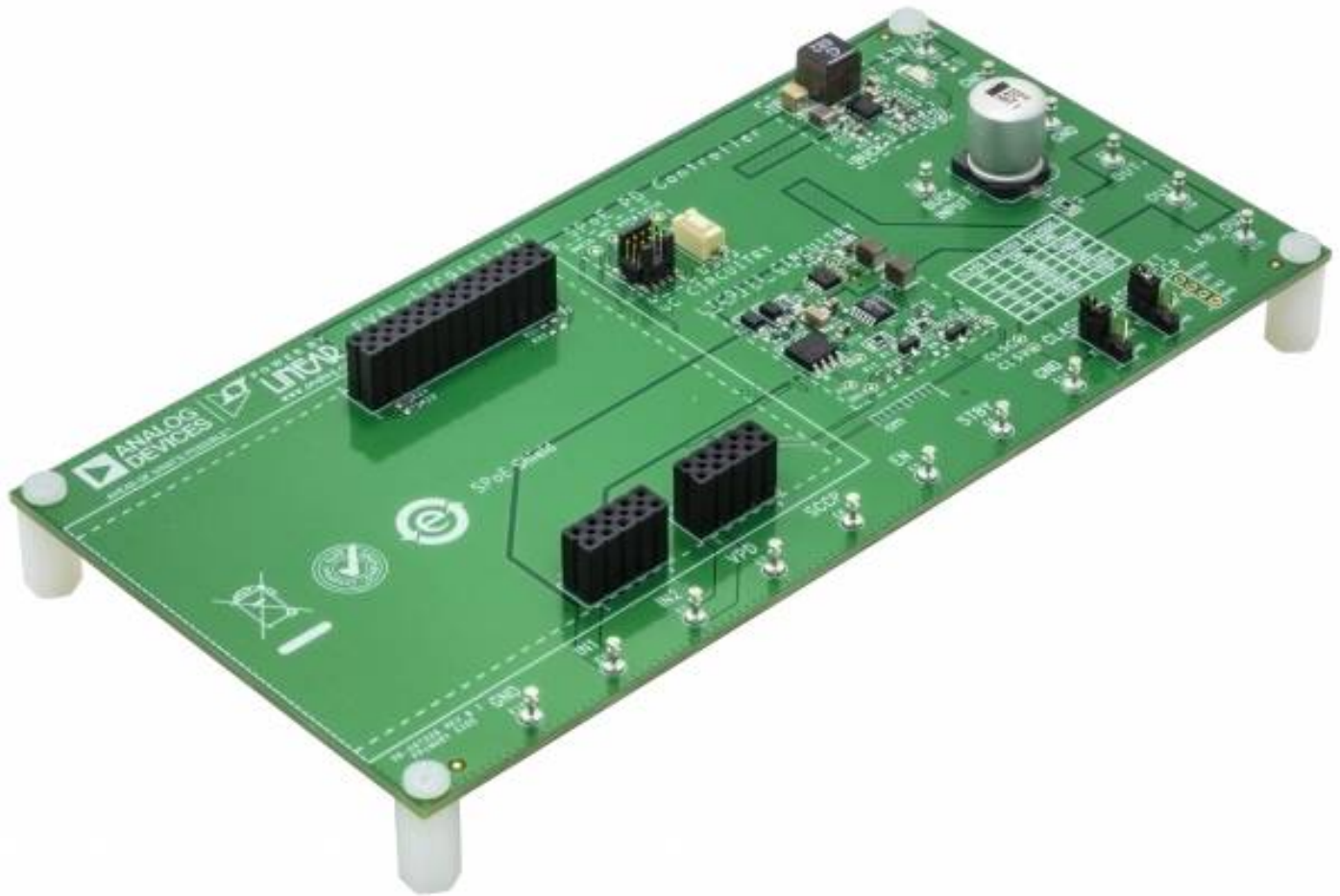The EVAL-LTC9111-AZ is an 802.3cg PD motherboard use for evaluating the LTC9111.

Figure 9. EVAL-LTC9111-AZ.

Shield Installation

The EVAL-LTC9111-AZ PD motherboard can accept one media converter shield. For Class 10 through 14 evaluations, install the EVAL-10BT1L-SMC-AZ. For Class 15 evaluation, install the EVAL-10BT1L-SMC-BZ.

When inserting a shield on to the motherboard, align the shield's two short male headers with the two short female headers at a port on the motherboard. The longer header will naturally align. Note, the last two pins of the longer header on the mother board are reserved for future use and will not have pins inserted in them. Insert the shield until the headers are flush with each other. Before proceeding, verify no pins are sticking out indicating a misalignment. Powering the motherboard with a misaligned shield can cause damage to the system.

Figure 10. EVAL-LTC9111-AZ shield placement.

Jumper Settings

Set the CLASSC and CLASSV jumpers to the class for evaluation according to the table shown on the silkscreen.
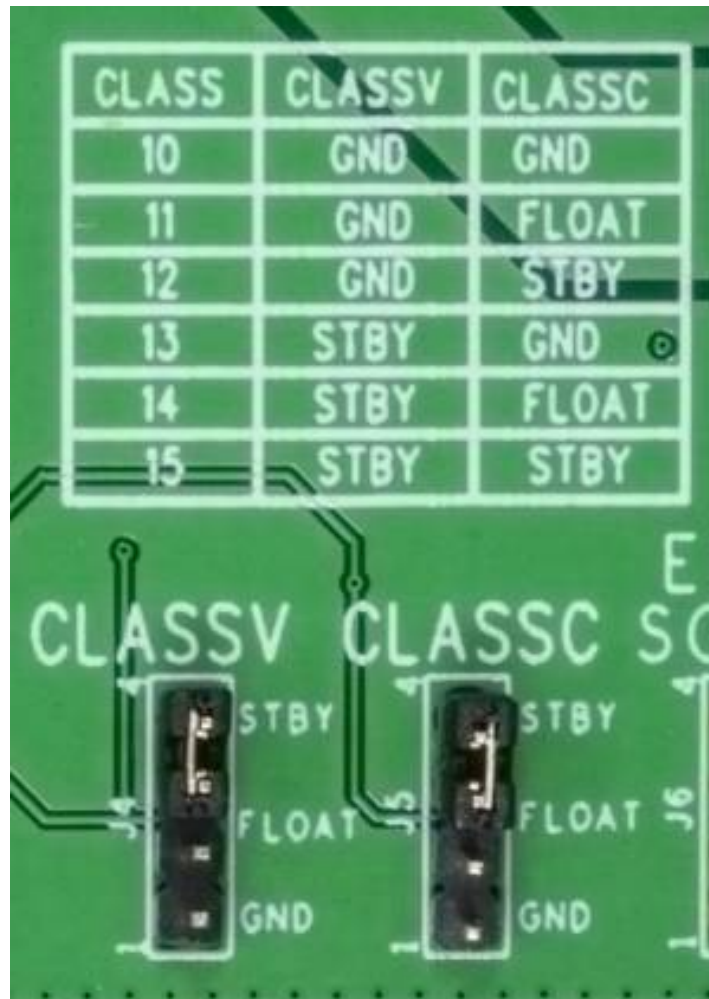
Figure 11. EVAL-LTC9111-AZ CLASSC and CLASSV jumpers.

The EVAL-LTC9111-AZ rev. 1 will have a P4 jumper; set this jumper to CONNECT for Class 10 to 14 or DISCONNECT for Class 15.
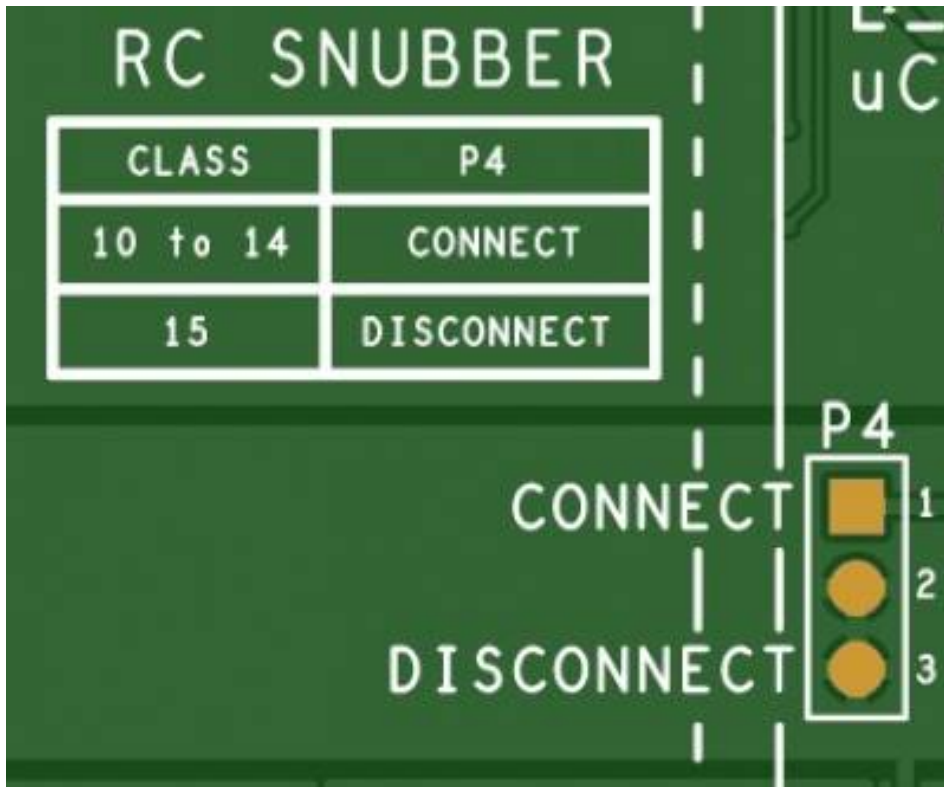
Figure 12. EVAL-LTC9111-AZ (rev 1) RC Snubber jumper.

SPoE Load Connection

In a typical application a DC/DC converter is connected across OUT+ and GND and enabled by the LTC9111.
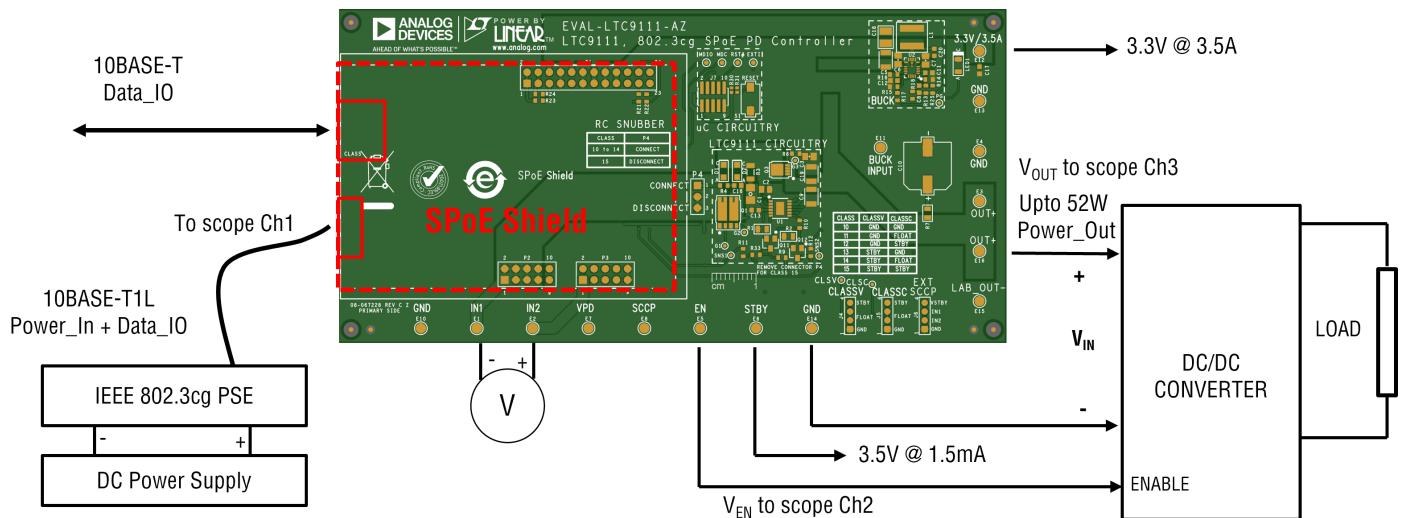

Figure 13. EVAL-LTC9111-AZ output connection to a DC/DC converter.

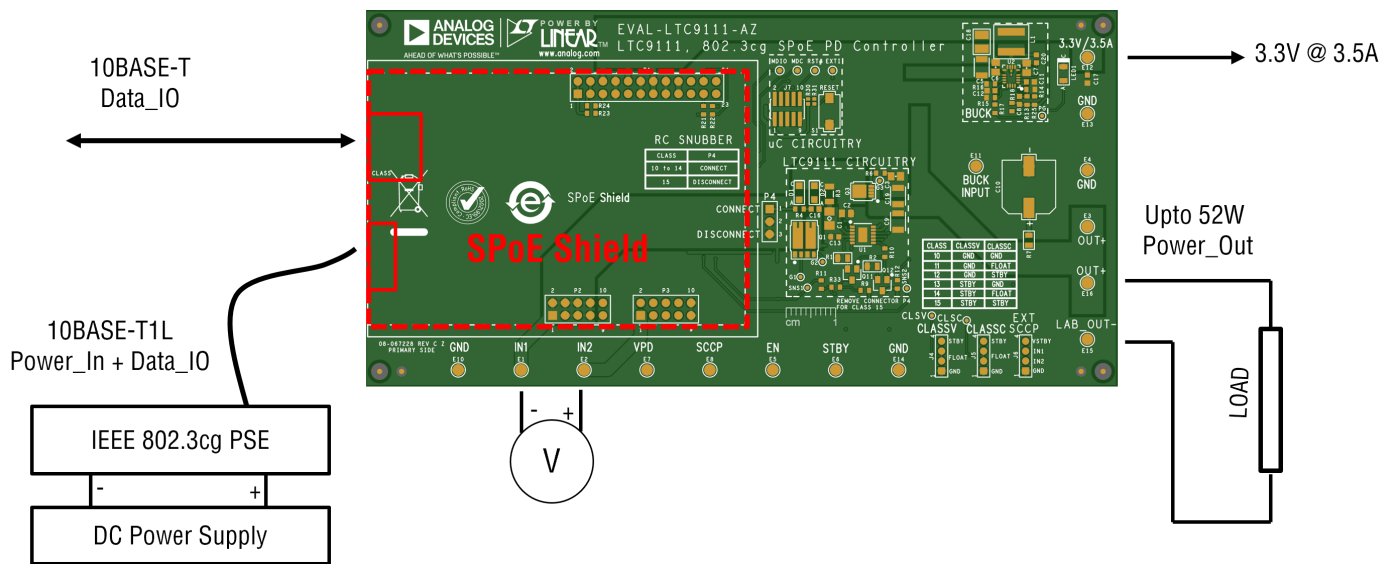For bench test purposes, connect passive loads such as a resistor across OUT+ and LAB_OUT-.

Figure 14. EVAL-LTC9111-AZ lab test output connection to a resistive load.

Onboard 3.3V

The EVAL-LTC9111-AZ PD motherboard has an onboard buck converter that steps the SPoE voltage down to 3.3V. This 3.3V is used to power up the media converter shield. Additional load may be connected to the 3.3V output.
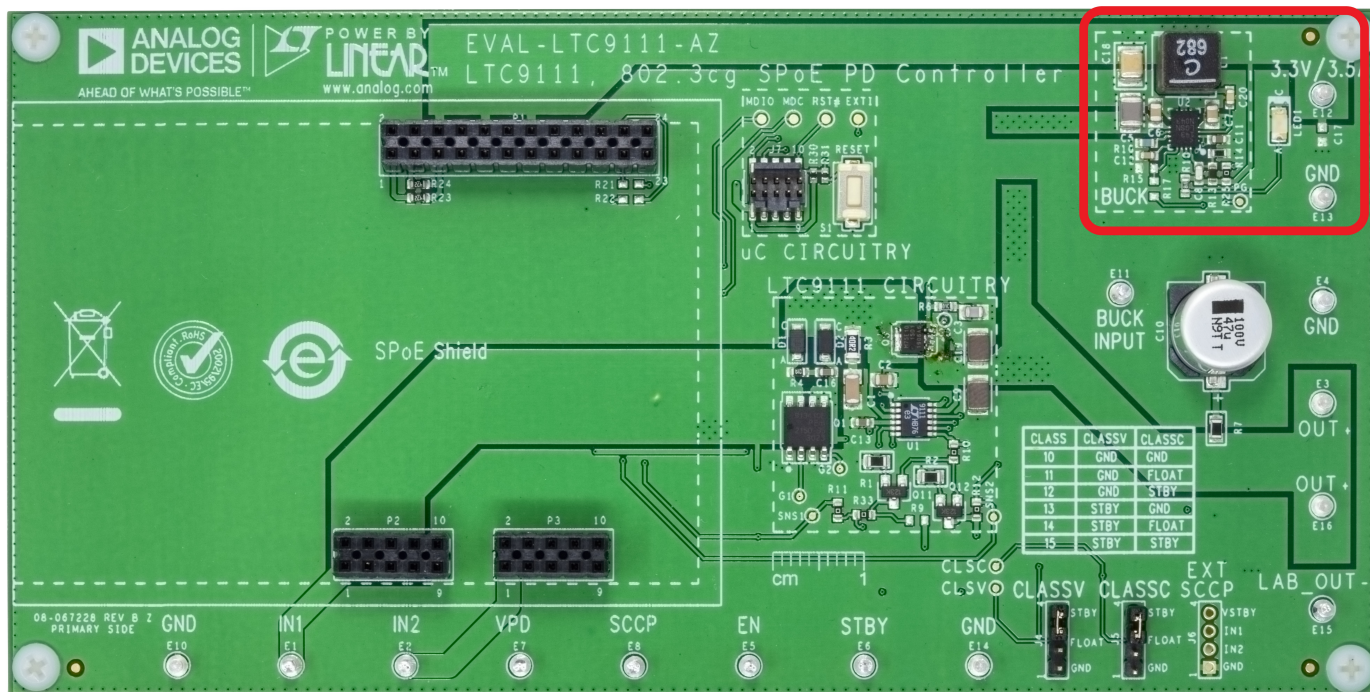

Figure 15. EVAL-LTC9111-AZ on board 3.3V buck.

Notes

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