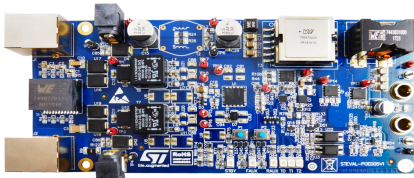


## 12V/8A, active clamp forward converter, Power Over Ethernet (PoE) IEEE 802.3bt compliant reference design



### Features

- Features of the [PM8805](#) PoE-PD interface:
  - System in package integrating a double active bridge, a hot-swap MOSFET and a PoE-PD
  - Supports legacy high power, 4-pair applications
  - 100 V N-ch MOSFETs with 0.2  $\Omega$  total path resistance for each active bridge
  - Identifies which kind of PSE (standard or legacy) is connected to, and provides successful IEEE802.3 af /at /bt classification indication as combination of the T0, T1 and T2 signals (open drain)
  - Smart operational mode selection through the STBY, FAUX and RAUX control signals
  - QFN 56 8x8mm package with 43 pins and 6 exposed pads
- Features of the [PM8804](#) PWM controller:
  - PWM peak current mode controller
  - Input operating voltage up to 75 V
  - Internal high voltage start up regulator with 20 mA capability
  - Programmable fixed frequency up to 1 Mhz
  - Soft start up with adjustable time
  - Soft turn off (optionally disabled)
  - Dual 1 A<sub>PK</sub>, low side complementary gate drivers
  - GATE2 optionally turned off for reduced consumption
  - 80% maximum duty cycle with internal slope compensation
  - QFN 16 3x3mm package with exposed pad

Product summary	
High power PoE PD, 12 V up to 8 A active clamp forward evaluation board	<a href="#">STEVAL-POE005V1</a>
PWM peak current mode controller for PoE and telecom systems	<a href="#">PM8804</a>
IEEE802.3bt PoE-PD interface with integrated dual-active bridge	<a href="#">PM8805</a>

### Description

This reference design represents a 12 V, 8 A converter solution ideal for various applications including building safety and security or surveillance, with a PoE-PD interface and a DC-DC active clamp forward converter.

The PoE-PD interface is based on the [PM8805](#) system in package device with two active bridges and an IEEE 802.3bt compliant Powered Device (PD) interface. It can be used in all medium-to-high power 2P and 4P high efficiency PoE and PoE+ applications.

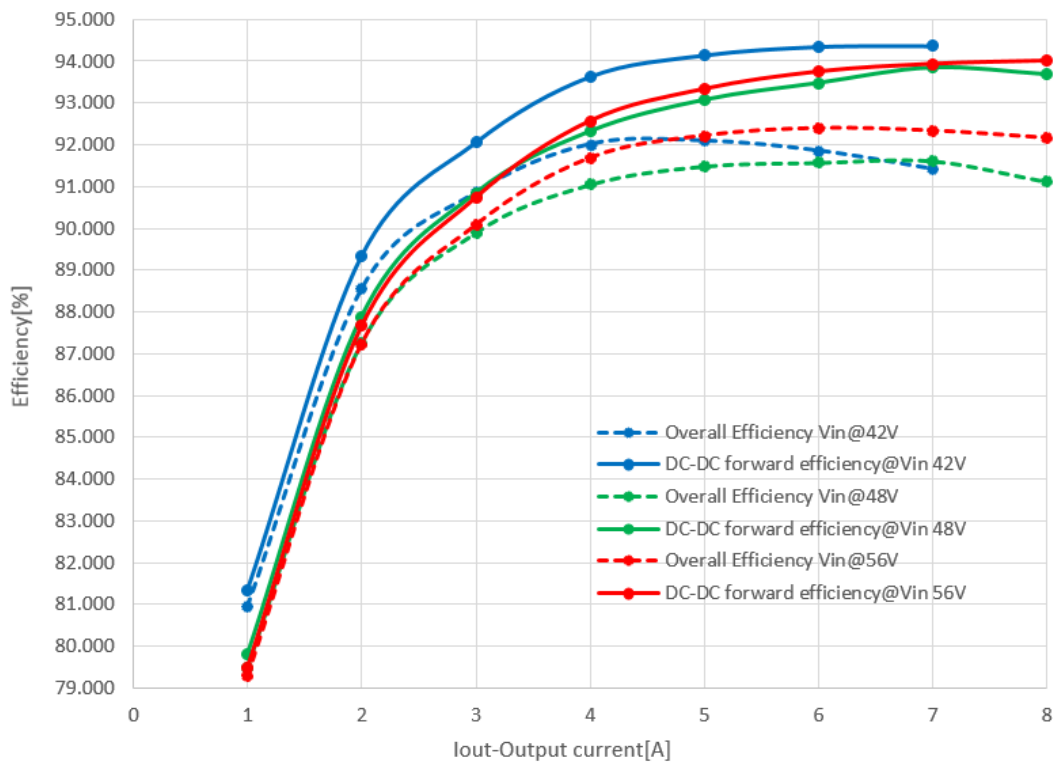
The DC-DC active clamp forward converter is designed around the [PM8804](#) PWM controller, which is an integrated solution for smart and efficient 48 V converters, featuring a programmable oscillator for the switching frequency, adjustable slope compensation, dual complementary low-side drivers with programmable dead time, programmable soft start, soft turn off and a programmable current sense blanking time.

# 1 Efficiency

The **STEVAL-POE005V1** reference design consists of a PoE interface compliant with the IEEE 802.3bt standard and a forward active clamp DC-DC converter that receives DC voltage from the PoE interface.

The figure below shows the efficiency of a single forward converter and the overall efficiency including the PoE interface power losses.

**Figure 1. STEVAL-POE005V1 overall and DC-DC forward efficiency**



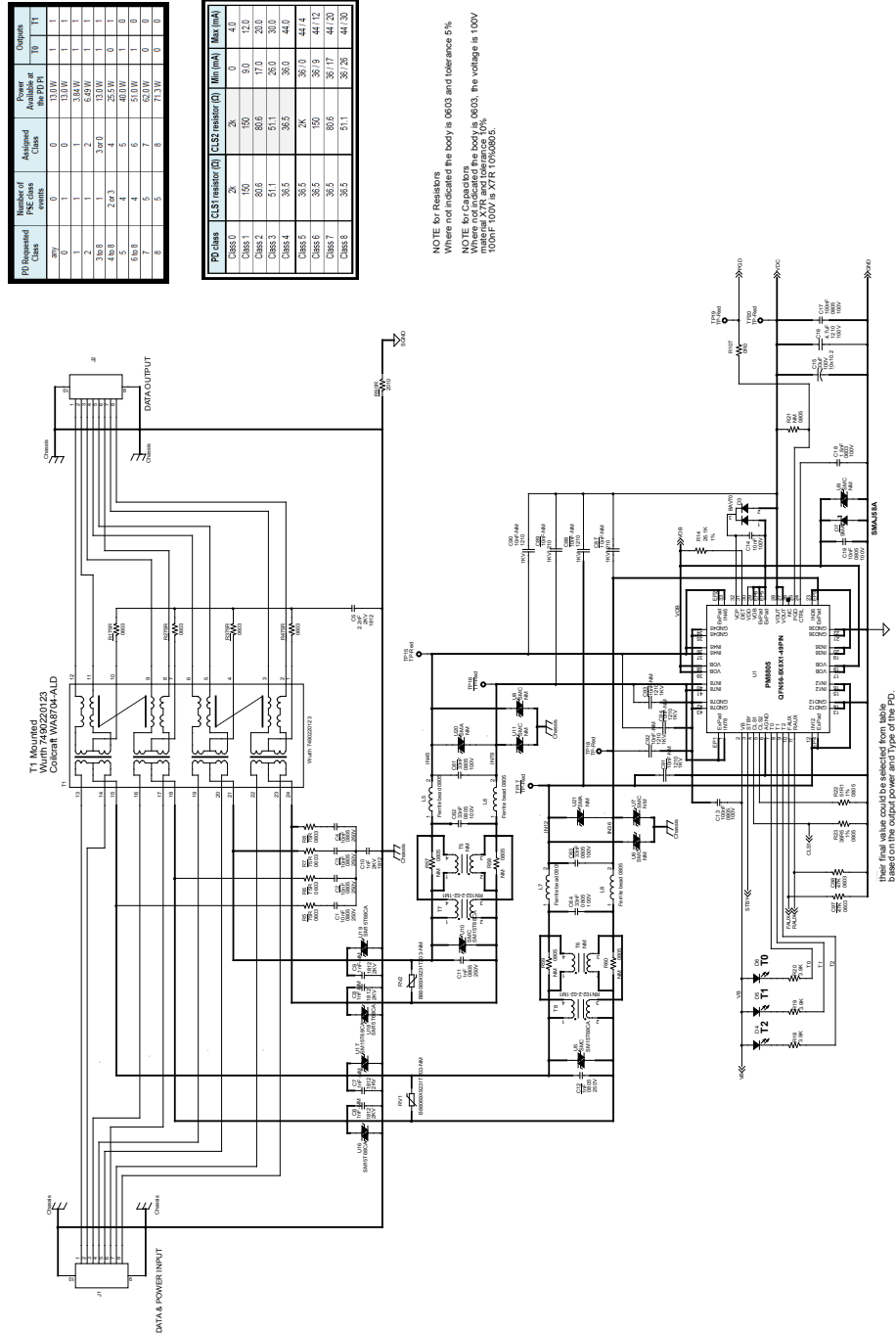
The dotted lines indicate the **STEVAL-POE005V1** efficiency at different DC input voltages applied to RJ45 connector J1. The continuous line indicates the DC-DC forward efficiency, which does not include the following losses associated with the PoE interface section:

- RJ45 connector J1
- PoE data transformer T1
- common chokes T7 and T8 placed on the two power supply pairs
- **PM8805** interface that integrates the dual power MOS bridges and a hot swap MOSFET
- Forward converter input filter

This efficiency is measured between output test points TP8/TP9 and input test points TP5/TP6 of the forward converter.

## 2 STEVAL-POE005V1 schematic diagrams

Figure 2. STEVAL-POE005V1 circuit schematic (1 of 3)



PD Requested class	Number of PSE class events	Assigned class	Power Available at the PDP	Classes Available at the PDP
0	0	0	13.5W	1
1	1	1	3.84W	1
2	1	2	6.63W	1
3	1	3	10.02W	1
4	2	4	25.5W	0
5	4	5	40.0W	1
6	4	6	51.0W	0
7	5	7	61.5W	0
8	5	8	71.3W	0

PD class	CLZ1 resistor (R)	CLZ2 resistor (R)	Min (mA)	Max (mA)
Class 0	2k	0	0	4.0
Class 1	150	150	9.0	12.0
Class 2	806	806	17.0	20.0
Class 3	511	511	26.0	30.0
Class 4	363	363	36.0	44.0
Class 5	265	265	46.0	54.0
Class 6	167	167	56.0	64.0
Class 7	82	82	66.0	74.0
Class 8	36.5	36.5	76.0	84.0

NOTE for Resistors  
Where not indicated the body is 0603 and tolerance 5%  
NOTE for Capacitors  
Where not indicated the body is 0603, the voltage is 100V  
material X7R and tolerance 10%  
100nF 100V is X7R104K0805

their final value could be selected from table based on the output power and type of the PD.

Figure 3. STEVAL-POE005V1 circuit schematic (2 of 3)

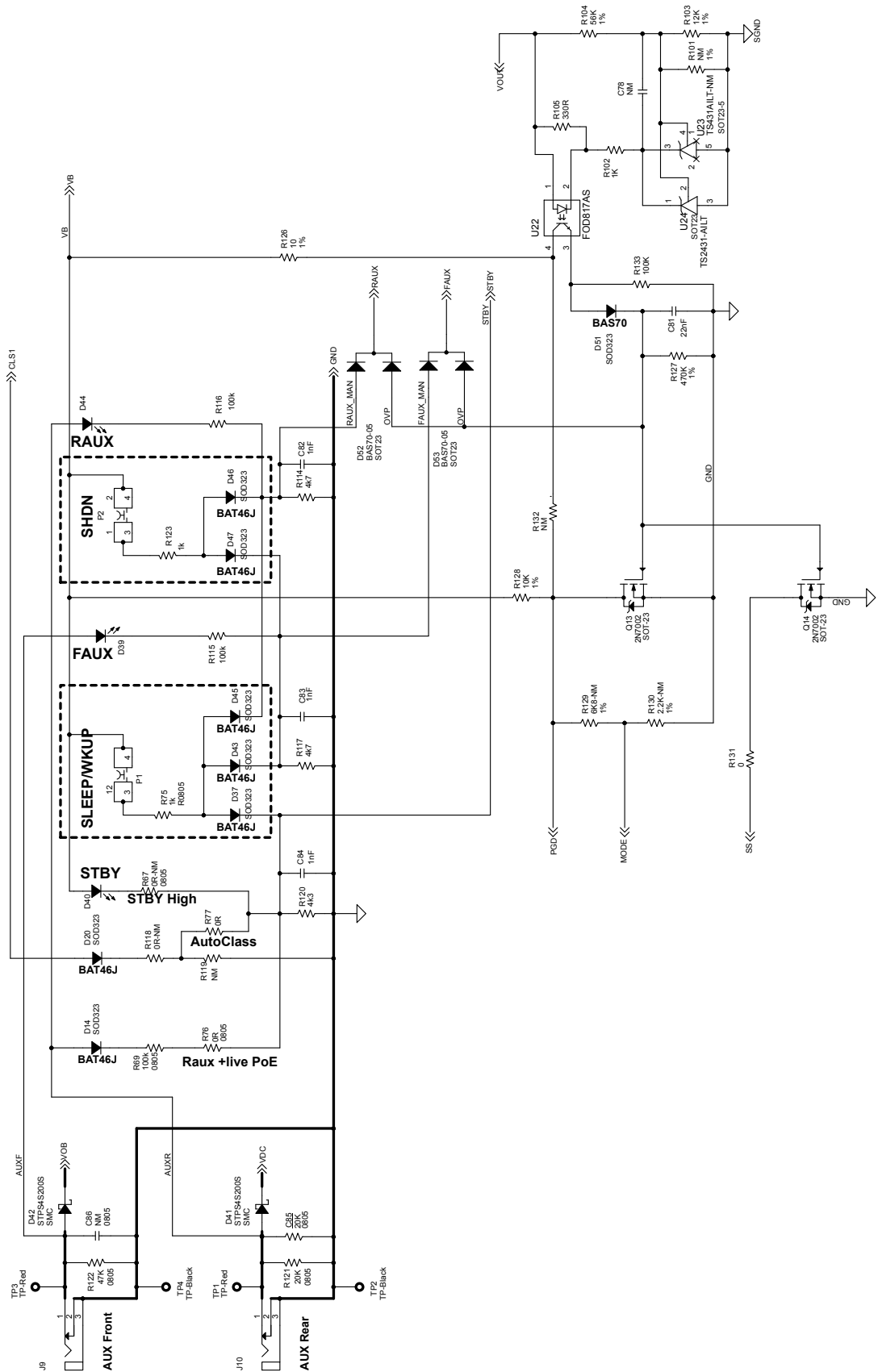
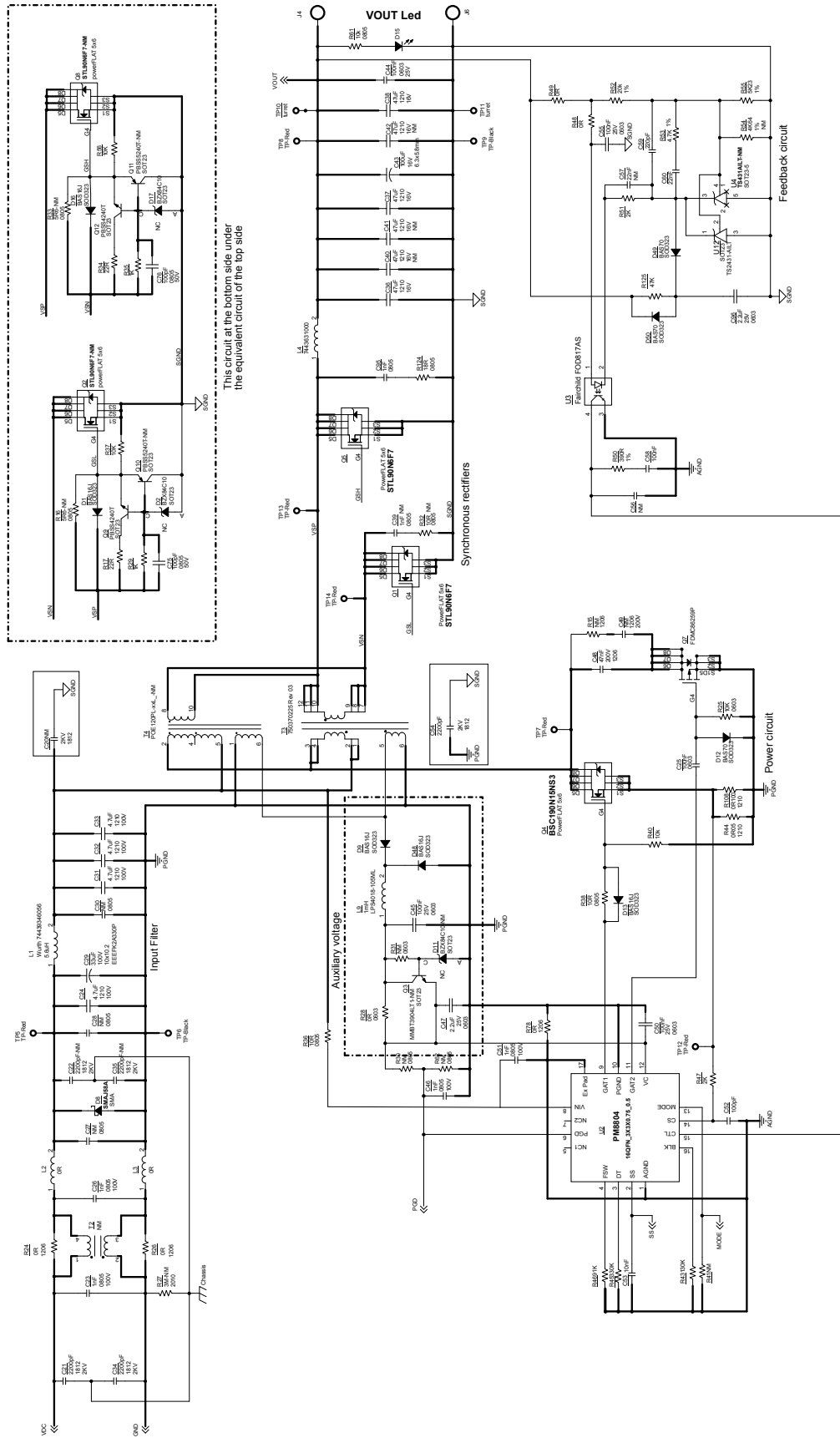


Figure 4. STEVAL-POE005V1 circuit schematic (3 of 3)



## Revision history

**Table 1. Document revision history**

Date	Version	Changes
05-Oct-2018	1	Initial release.
07-May-2019	2	Updated document title. Minor changes to cover page Features and Description.
14-Jun-2019	3	Updated cover page <a href="#">Features</a> and <a href="#">Description</a> .

**IMPORTANT NOTICE – PLEASE READ CAREFULLY**

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, please refer to [www.st.com/trademarks](http://www.st.com/trademarks). All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2019 STMicroelectronics – All rights reserved

## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for* [Power Management IC Development Tools](#) *category:*

*Click to view products by* [STMicroelectronics](#) *manufacturer:*

Other Similar products are found below :

[EVAL-ADM1168LQEBZ](#) [EVB-EP5348UI](#) [MIC23451-AAAYFL EV](#) [MIC5281YMME EV](#) [DA9063-EVAL](#) [ADP122-3.3-EVALZ](#) [ADP130-0.8-EVALZ](#) [ADP130-1.2-EVALZ](#) [ADP130-1.5-EVALZ](#) [ADP130-1.8-EVALZ](#) [ADP1712-3.3-EVALZ](#) [ADP1714-3.3-EVALZ](#) [ADP1715-3.3-EVALZ](#) [ADP1716-2.5-EVALZ](#) [ADP1740-1.5-EVALZ](#) [ADP1752-1.5-EVALZ](#) [ADP1828LC-EVALZ](#) [ADP1870-0.3-EVALZ](#) [ADP1871-0.6-EVALZ](#) [ADP1873-0.6-EVALZ](#) [ADP1874-0.3-EVALZ](#) [ADP1882-1.0-EVALZ](#) [ADP199CB-EVALZ](#) [ADP2102-1.25-EVALZ](#) [ADP2102-1.875EVALZ](#) [ADP2102-1.8-EVALZ](#) [ADP2102-2-EVALZ](#) [ADP2102-3-EVALZ](#) [ADP2102-4-EVALZ](#) [ADP2106-1.8-EVALZ](#) [ADP2147CB-110EVALZ](#) [AS3606-DB](#) [BQ24010EVM](#) [BQ24075TEVM](#) [BQ24155EVM](#) [BQ24157EVM-697](#) [BQ24160EVM-742](#) [BQ24296MEVM-655](#) [BQ25010EVM](#) [BQ3055EVM](#) [NCV891330PD50GEVB](#) [ISLUSBI2CKIT1Z](#) [LM2744EVAL](#) [LM2854EVAL](#) [LM3658SD-AEV/NOPB](#) [LM3658SDEV/NOPB](#) [LM3691TL-1.8EV/NOPB](#) [LM4510SDEV/NOPB](#) [LM5033SD-EVAL](#) [LP38512TS-1.8EV](#)