

### Introduction

The EV board concept is intended to provide customers with an easy way to connect ST's surface mounted VIPower® drivers into their existing prototype circuitry. The EV boards come pre-assembled with one of ST's VIPower high-side drivers.

**Figure 1. PowerSSO-24 evaluation board**



These boards provide mounting solutions and some heat sinking capability for prototype development. There are still external components required to make these devices work in any application.

**Figure 2. PowerSSO-24 package**



This document provides application schematics for the following evaluation boards:

**Table 1. Evaluation board**

12 V digital devices	12 V analog devices	24 V system device
EV-VND5E050K	EV-VND5E025AK	EV-VND5T035AK
EV-VNQ5E160K	EV-VNQ5E050AK	
EV-VNQ5E050K	EV-VNQ5E160AK	
	EV-VNQ5027AK	

# Contents

- 1      Application schematics ..... 4**
  - 1.1    Digital feedback designs ..... 4
    - 1.1.1    VND5E050K-E application schematic ..... 5
    - 1.1.2    VNQ5E160K-E and VNQ5E050K-E application schematic ..... 5
  - 1.2    Analog feedback drivers ..... 6
    - 1.2.1    VNQ5027AK-E, VNQ5E050AK and VNQ5E160AK application schematic ..... 6
    - 1.2.2    VND5E025AK application schematic ..... 7
  - 1.3    24 V system devices ..... 8
    - 1.3.1    VND5T035AK-E application schematic ..... 8
  
- Appendix A    Reference documents ..... 9**
  
- Revision history ..... 10**

## List of figures

Figure 1.	PowerSSO-24 evaluation board . . . . .	1
Figure 2.	PowerSSO-24 package . . . . .	1
Figure 3.	Typical dual output HSD with digital feedback block diagram . . . . .	4
Figure 4.	VND5E050K-E evaluation board application schematic . . . . .	5
Figure 5.	VNQ5E160K/VNQ5E050K evaluation board application schematic. . . . .	5
Figure 6.	Typical quad output analog feedback high-side driver block diagram . . . . .	6
Figure 7.	VNQ5027AK, VNQ5E050AK, and VNQ5E160AK evaluation board application schematic . 6	
Figure 8.	VND5E025AK evaluation board application schematic . . . . .	7
Figure 9.	VND5T035AK evaluation board application schematic . . . . .	8

# 1 Application schematics

The evaluation boards themselves do not have any components other than the high-side driver that is mounted on it. The schematics provided in this document are recommended for their proper functionality. All designs have different needs and requirements. Whatever design you decide to use, it will still need to be verified in order to meet your application specifications. ST implies no guarantee or warranty (see [Appendix A: Reference documents](#)).

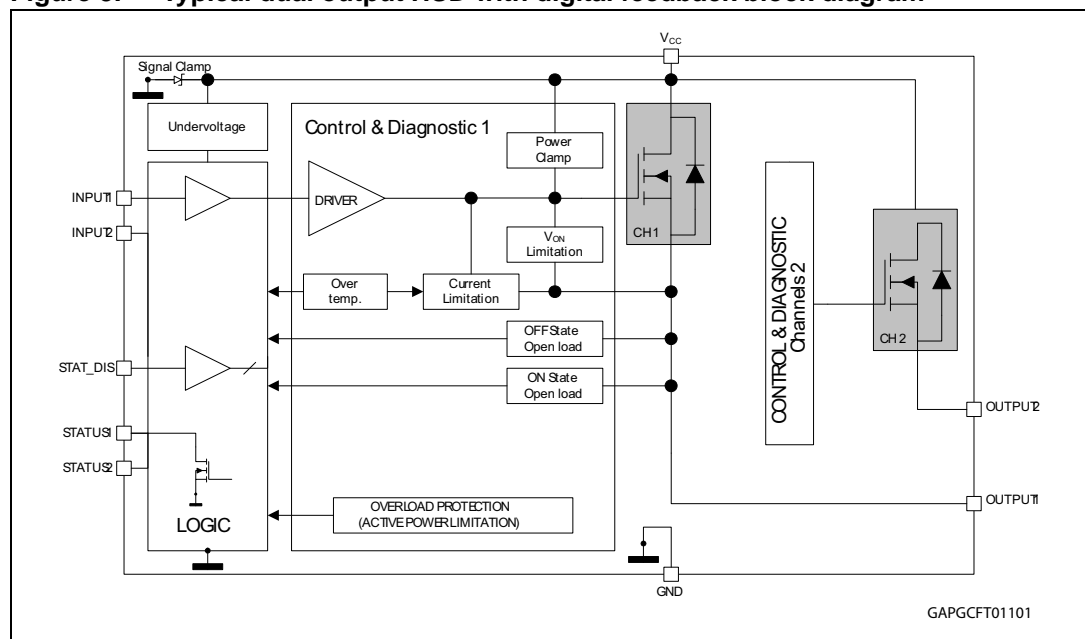
*Note:* When more than one pin is used for an output, all output pins must be tied together for proper operation.

ST has produced two user manuals: the UM1556 (for 12 V devices) and the UM1557 (for 24 V devices) (see [Appendix A: Reference documents](#)). Those user manuals are VIPower hardware design guides that provide the necessary information to successfully design your circuit using our VIPower drivers.

## 1.1 Digital feedback designs

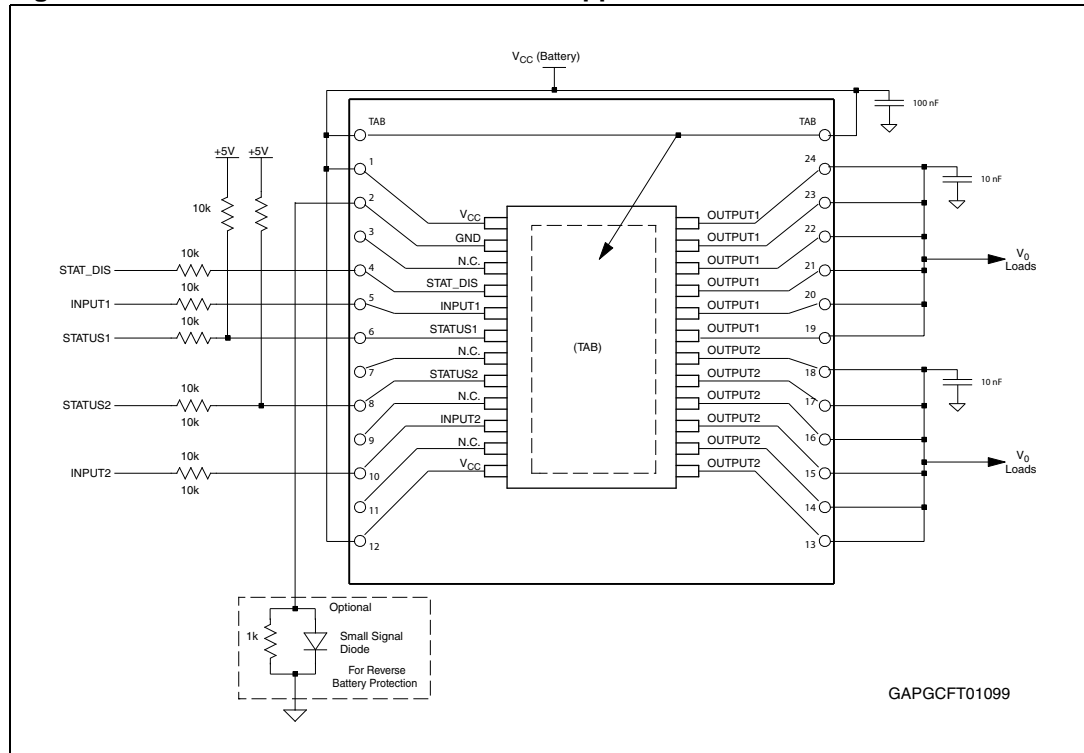
These devices have a logic level fault pin that is pulled low when a fault is detected and the status disable (ST\_DIS) pin is held low. The feedback is an open Drain configuration and requires a pull-up resistor for proper operation. For this package type (PowerSSO-24) there are dual and quad output devices.

**Figure 3. Typical dual output HSD with digital feedback block diagram**



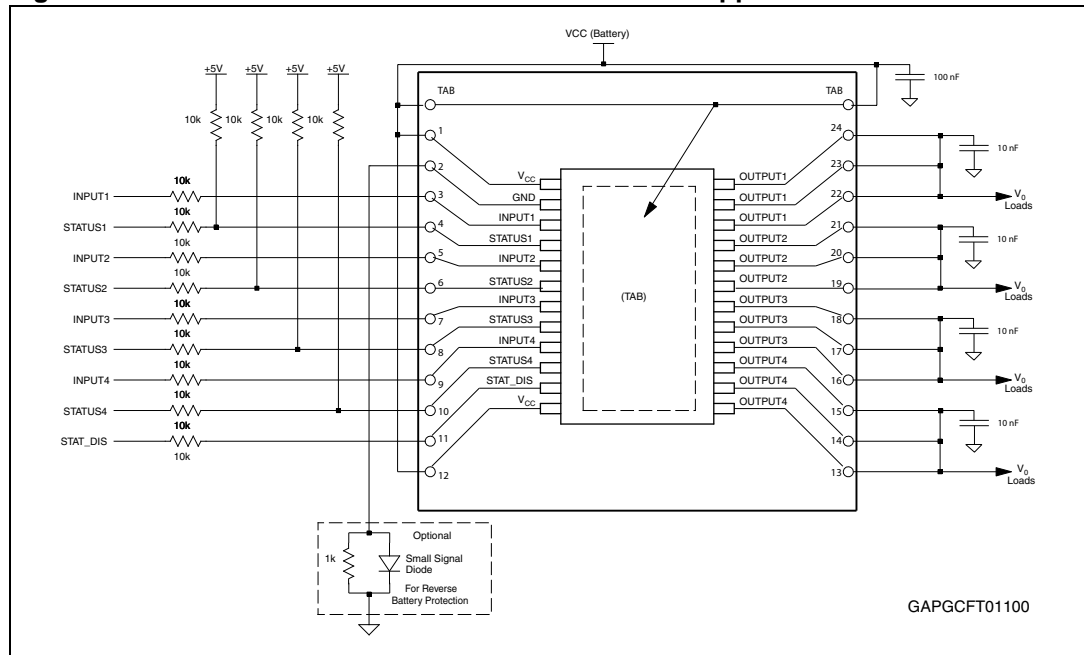
### 1.1.1 VND5E050K-E application schematic

Figure 4. VND5E050K-E evaluation board application schematic



### 1.1.2 VNQ5E160K-E and VNQ5E050K-E application schematic

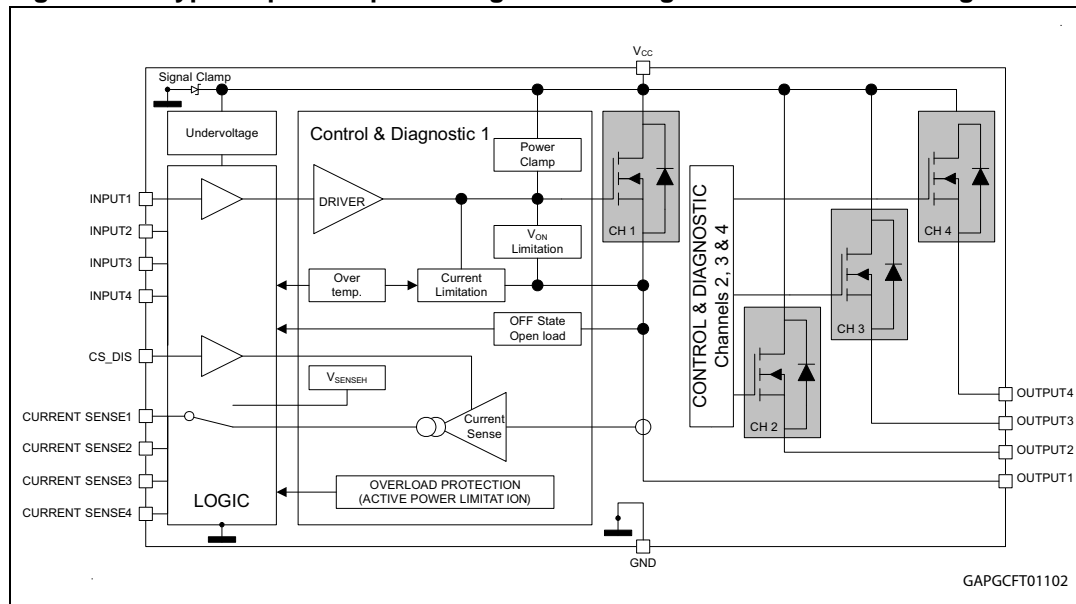
Figure 5. VNQ5E160K/VNQ5E050K evaluation board application schematic



## 1.2 Analog feedback drivers

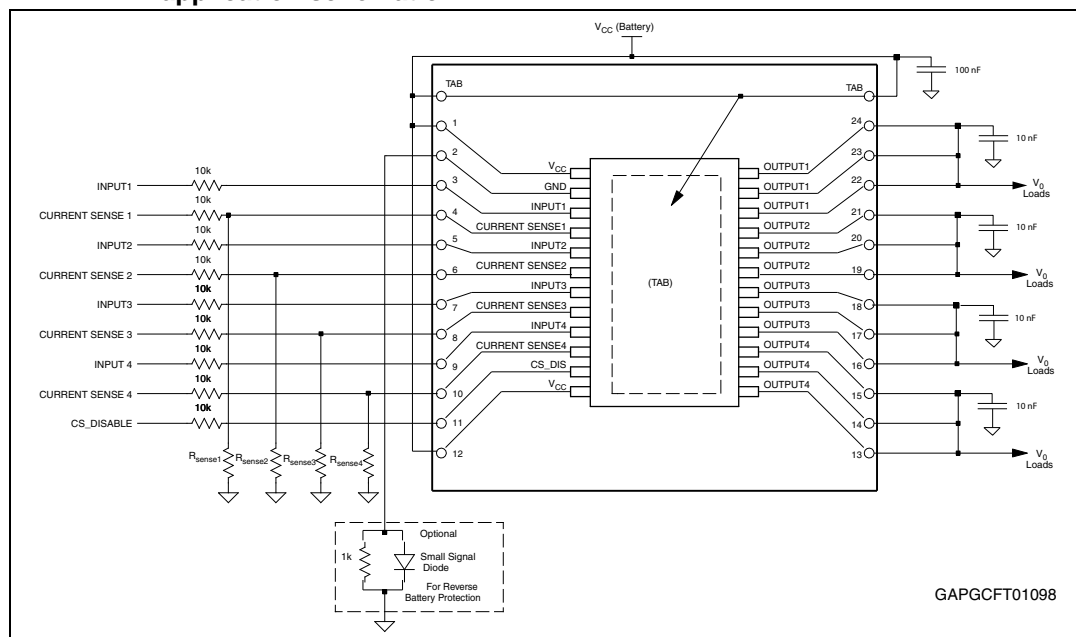
Analog feedback devices have a sense resistor that, when properly scaled, provides a reasonable representation of the output current in terms of voltage that can be measured as well as its diagnostic information. How to properly scale that resistor can be found in the user manual UM1556 (see [Appendix A: Reference documents](#)).

**Figure 6. Typical quad output analog feedback high-side driver block diagram**



### 1.2.1 VNQ5027AK-E, VNQ5E050AK and VNQ5E160AK application schematic

**Figure 7. VNQ5027AK, VNQ5E050AK, and VNQ5E160AK evaluation board application schematic**



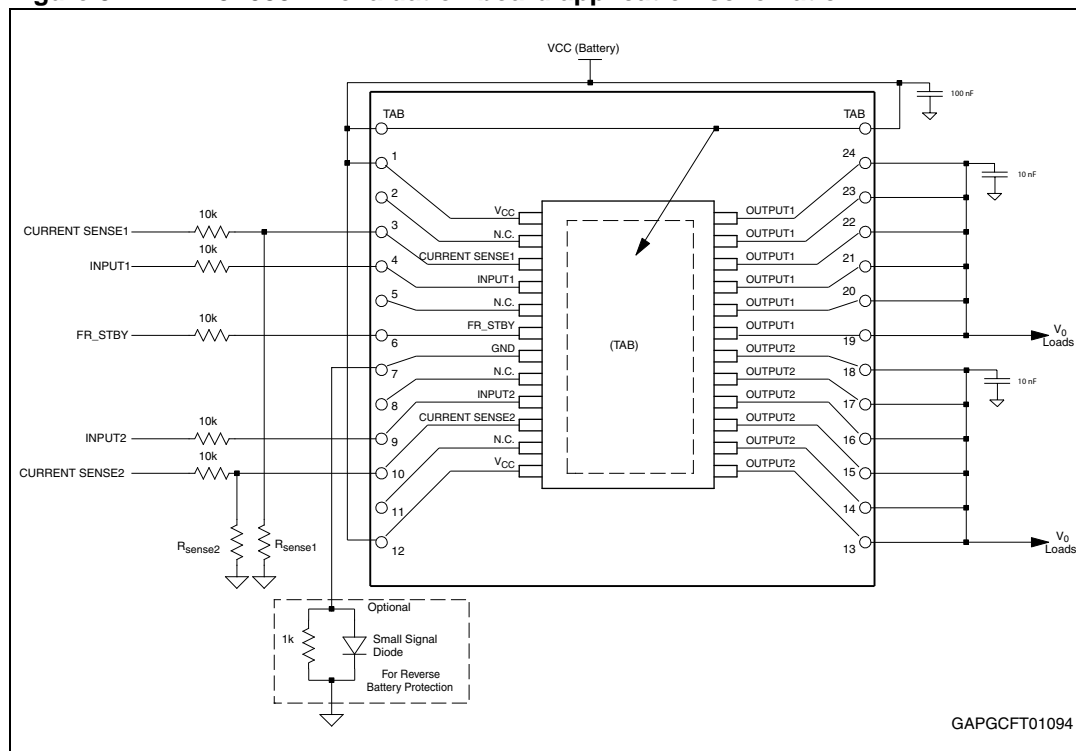


### 1.3 24 V system devices

#### 1.3.1 VND5T035AK-E application schematic

The VND5T035AK is a 24V system device. The maximum voltage rating for this device is elevated from the standard 41V to 58V. 24 V products are equipped with a latch-off feature keeping the device switched-off once power limitation or thermal shutdown is triggered. This latch can be activated by holding the FR\_STBY pin high. Resetting the device to retry the load requires pulling the FR\_STBY pin low. Leaving the FR\_STBY pin low will disable the latch off feature and lets the part automatically retry shorted loads. More details can be found in the user manual UM1557 (see [Appendix A: Reference documents](#)).

Figure 9. VND5T035AK evaluation board application schematic





## Appendix A Reference documents

1. VND5E050K evaluation board (EV-VND5E050K, DocID 023989)
2. VNQ5E160K evaluation board (EV-VNQ5E160K, DocID 023996)
3. VNQ5E050K evaluation board (EV-VN5E050AJ, DocID 023995)
4. VND5E025AK evaluation board (EV-VND5E050AJ, DocID 023978)
5. VNQ5E050AK evaluation board (EV-VNQ5E050AK, DocID 023979)
6. VNQ5E160AK evaluation board (EV-VNQ5E160AK, DocID 023980)
7. VNQ5027AK evaluation board (EV-VNQ5027AK, DocID 023981)
8. VND5T035AK evaluation board (EV-VND5E160J, DocID 023987)
9. VND5T100AJ evaluation board (EV-VND5T100AJ, DocID 023967)
10. VIPower M0-5 and M0-5Enhanced high-side drivers (UM1556, DocID 023520)
11. VIPower MO-5T: high-side switches for 24V systems (UM1557, DocID 023521)
12. Evaluation Product Licence Agreement on [www.st.com](http://www.st.com)

## Revision history

**Table 2. Document revision history**

Date	Revision	Changes
03-Dec-2012	1	Initial release.

**Please Read Carefully:**

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

**UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.**

**UNLESS EXPRESSLY APPROVED IN WRITING BY TWO AUTHORIZED ST REPRESENTATIVES, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.**

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2012 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

[www.st.com](http://www.st.com)

