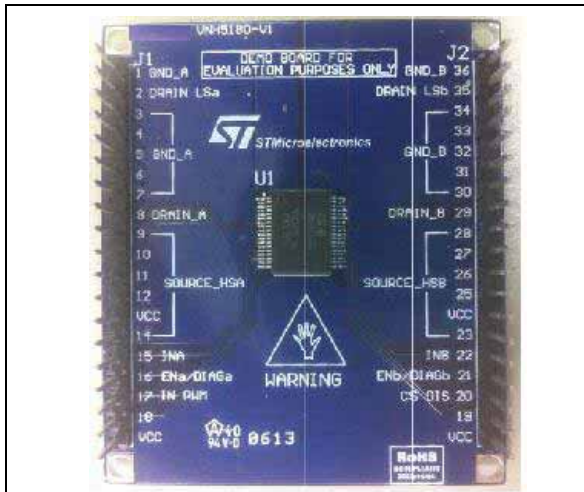




THE DATASHEET OF EV-VNH5180A





Description

EV-VNH5180A provides you an easy way to connect ST's surface mounted VIPower[®] H-Bridge drivers into your existing prototype circuitry. This evaluation board comes preassembled with VNH5180A-E H-Bridge.

The VNH5180A-E is a system in package H-Bridge manufactured in the ST proprietary VIPower M0-5 technology and housed in the PowerSSO-36 package. The VNH5180A-E is designed to drive 12 V automotive bidirectional load such as a PMDC motor. The VNH5180A-E provides protection, diagnostics and easy 3 V and 5 V CMOS-compatible interface with any microcontroller.

The device integrates advanced protection functions such as load current limitation, inrush and active overload management by power limitation, overtemperature shut-off with autorestart and overvoltage active clamp. A dedicated analog current sense pin is associated with every output channel in order to provide Enhanced diagnostic functions including fast detection of overload and short-circuit to ground through power limitation indication, overtemperature indication, short-circuit to V_{CC} protection and diagnosis as well as on-state and off-state open-load detection. The current sensing and diagnostic feedback of the whole device can be disabled by pulling the CS_DIS pin high to allow sharing of the external sense resistor with other similar devices.

Features

Parameter	Symbol	Value	Unit
Max supply voltage	V_{CC}	41	V
Operating voltage range	V_{CC}	5.5 to 18	V
Max on-state resistance (per leg)	R_{ON}	50	m Ω
High-side current limitation (typ)	I_{UMH}	42	A
Off-state supply current	I_s	3	μ A

- Simple single IC application board dedicated for VNH5180-E
- Provides thermal heat-sinking for ease of use in prototyping
- Provides electrical connectivity for easy prototyping

Table 1. Device summary

Order codes	Reference
EV-VNH5180	EV-VNH5180A evaluation board

Contents

1	Design recommendations	5
2	Thermal data	6
3	Board connector reference	7
4	Package information	9
4.1	ECOPACK® packages	9
Appendix A	Reference documents	10
	Revision history	11

List of tables

Table 1.	Device summary	1
Table 2.	VNH5180A thermal data.	6
Table 3.	PCB specifications	6
Table 4.	Board connector specification.	7
Table 5.	Document revision history	11

List of figures

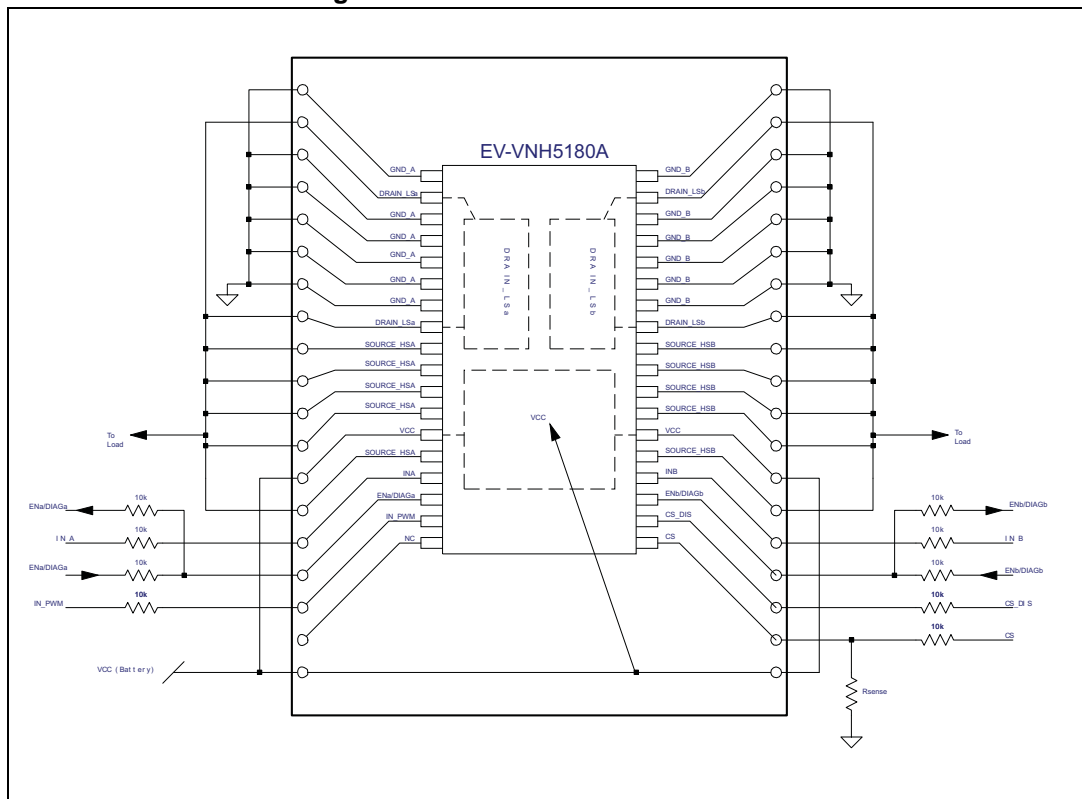
Figure 1.	VNH5180A evaluation board	5
Figure 2.	Board layout	7

1 Design recommendations

This evaluation board provides mounting and some heat sinking capability for prototype development, but there are still external components that are required to make these devices work in any application.

Figure 1 illustrates the necessary components for any application.

Figure 1. VNH5180A evaluation board



Please note that the high side drains and the low side sources are not tied together internally. To make the H-Bridge the SOURCE_HSa pins must be electrically connected to the DRAIN_LSa pins. The same applies for the SOURCE_HSb and DRAIN_LSb pins.

ST has produced a user manual for safe designs using ST’s VIPower devices. This is UM1556 (see [Section Appendix A: Reference documents](#)). UM1556 is a VIPower Hardware design guide that provides all of the necessary information to successfully design your circuit using our VIPower drivers.

All designs have different needs and requirements. Whatever design you decide to use you will still need to verify that it meets your application needs. ST implies no guarantee or warranty (see [Section Appendix A: Reference documents](#)).

2 Thermal data

Table 2. VNH5180A thermal data

Symbol	Parameter	Max. value	Unit
$R_{thj-amb}$ HSD	Thermal resistance junction-ambient (MAX)	31	°C/W
$R_{thj-amb}$ LSD	Thermal resistance junction-ambient (MAX)	40	°C/W

Table 3. PCB specifications

Parameter	Value	Unit
Board dimensions	51 x 58	mm
Number of Cu layer	2	—
Layer Cu thickness	70	μm
Board finish thickness	1.6 +/- 10%	mm
Board Material	FR4	—
Thermal vias separation	1.2	mm
Thermal vias diameter	0.3 +/- 0.08	mm

3 Board connector reference

Figure 2. Board layout

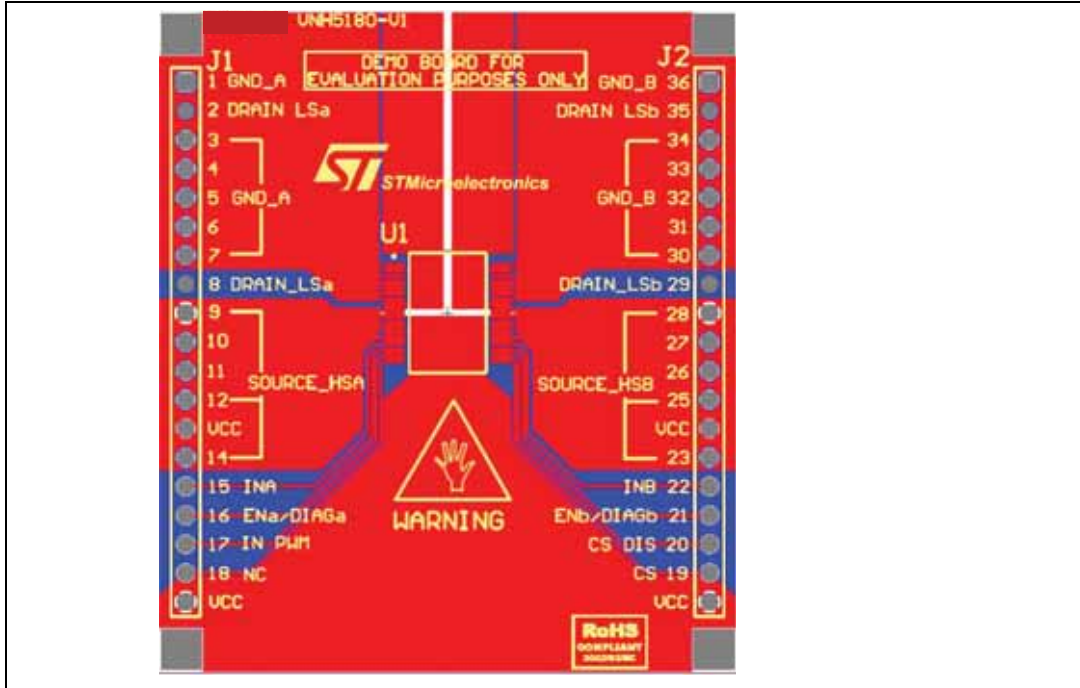


Table 4. Board connector specification

Connector	Board lead number	Device pin function ⁽¹⁾
J1	1	GND_A
J1	2	Drain_LSa
J1	3	GND_A
J1	4	GND_A
J1	5	GND_A
J1	6	GND_A
J1	7	GND_A
J1	8	Drain_LSa
J1	9	SOURCE_HSa
J1	10	SOURCE_HSa
J1	11	SOURCE_HSa
J1	12	SOURCE_HSa
J1	13	V _{CC}
J1	14	SOURCE_HSa
J1	15	INA
J1	16	ENa/DIAGa

Table 4. Board connector specification (continued)

Connector	Board lead number	Device pin function ⁽¹⁾
J1	17	IN_PWM
J1	18	NC
J1	V _{CC}	V _{CC}
J2	V _{CC}	V _{CC}
J2	19	CS
J2	20	CS_DIS
J2	21	ENb/DIAGb
J2	22	INB
J2	23	SOURCE_HSb
J2	24	V _{CC}
J2	25	SOURCE_HSb
J2	26	SOURCE_HSb
J2	27	SOURCE_HSb
J2	28	SOURCE_HSb
J2	29	Drain_LSb
J2	30	GND_B
J2	31	GND_B
J2	32	GND_B
J2	33	GND_B
J2	34	GND_B
J2	35	DRAIN_LSb
J2	36	GND_B

1. For further clarification on pin functions please refer to the related datasheet (see [Appendix A: Reference documents](#)).

4 Package information

4.1 ECOPACK[®] packages

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK[®] packages, depending on their level of environmental compliance. ECOPACK[®] specifications, grade definitions and product status are available at: www.st.com. ECOPACK[®] is an ST trademark.

Appendix A Reference documents

- VIPower M0-5 and M0-5Enhanced high-side drivers (UM1556, DocID 023520)
- Evaluation Product Licence Agreement on www.st.com

Revision history

Table 5. Document revision history

Date	Revision	Changes
29-Jul-2013	1	Initial release.
17-Sep-2013	2	Updated disclaimer.
11-Feb-2014	3	Updated <i>Description</i> .

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.

ST PRODUCTS ARE NOT DESIGNED OR AUTHORIZED FOR USE IN: (A) SAFETY CRITICAL APPLICATIONS SUCH AS LIFE SUPPORTING, ACTIVE IMPLANTED DEVICES OR SYSTEMS WITH PRODUCT FUNCTIONAL SAFETY REQUIREMENTS; (B) AERONAUTIC APPLICATIONS; (C) AUTOMOTIVE APPLICATIONS OR ENVIRONMENTS, AND/OR (D) AEROSPACE APPLICATIONS OR ENVIRONMENTS. WHERE ST PRODUCTS ARE NOT DESIGNED FOR SUCH USE, THE PURCHASER SHALL USE PRODUCTS AT PURCHASER'S SOLE RISK, EVEN IF ST HAS BEEN INFORMED IN WRITING OF SUCH USAGE, UNLESS A PRODUCT IS EXPRESSLY DESIGNATED BY ST AS BEING INTENDED FOR "AUTOMOTIVE, AUTOMOTIVE SAFETY OR MEDICAL" INDUSTRY DOMAINS ACCORDING TO ST PRODUCT DESIGN SPECIFICATIONS. PRODUCTS FORMALLY ESCC, QML OR JAN QUALIFIED ARE DEEMED SUITABLE FOR USE IN AEROSPACE BY THE CORRESPONDING GOVERNMENTAL AGENCY.

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.

© 2014 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