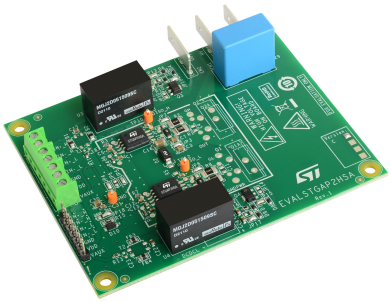
EVALSTGAP2HSAC

Data brief

Demonstration board for STGAP2HSAC automotive grade isolated 4 A single gate driver



Product status link

EVALSTGAP2HSAC

Features

- **Board**
  - High voltage rail up to 1200 V
  - Negative gate driving
  - Onboard isolated DC-DC converters to supply high-side and low-side gate drivers, fed by VAUX = 5 V, with 5.2 kV maximum isolation
  - 3.3 V VDD logic supply generated onboard
  - Easy jumper selection of driving voltage configuration: +15/0 V; +15/-3 V; +19/0 V; +19/-3 V;
- **Device**
  - Driver current capability: 4 A source/sink @ 25°C
  - Galvanic isolation:
    - 6000 V_{PK} surge
    - 3500 V_{RMS} isolation rating (UL 1577)
  - Short propagation delay: 60 ns
  - UVLO function
  - Gate driving voltage up to 26 V
  - 3.3 V, 5 V TTL/CMOS inputs with hysteresis
  - Temperature shutdown protection
  - Standby function
  - 4 A Miller CLAMP

Description

The EVALSTGAP2HSAC is an automotive grade isolated single gate driver.

The gate driver is characterized by 4 A current capability and rail-to-rail outputs, making the device suitable also for high power inverter applications such as motor drivers in industrial applications equipped with MOSFET / IGBT power switch.

The configuration featuring single output pin and Miller CLAMP function allows avoiding gate spikes during fast commutations in half-bridge topologies.

The device integrates protection functions: UVLO and thermal shutdown are included to easily design high reliability systems. Dual input pins allow choosing the control signal polarity and also implementing HW interlocking protection in order to avoid cross-conduction in case of controller's malfunction.

The device allows implementing negative gate driving, and the onboard isolated DC-DC converters allow working with optimized driving voltage for MOSFET/IGBT.

The EVALSTGAP2HSAC board allows evaluating all the STGAP2HSAC features while driving a half-bridge power stage with voltage rating up to 1200 V in TO-220 or TO-247 package.

The board allows easily selecting and modifying the values of relevant external components in order to ease driver performance evaluation under different applicative conditions and fine pre-tuning of the final application’s components.

1 Schematic diagram

Figure 1. **EVALSTGAP2HSAC circuit schematic – gate drivers**

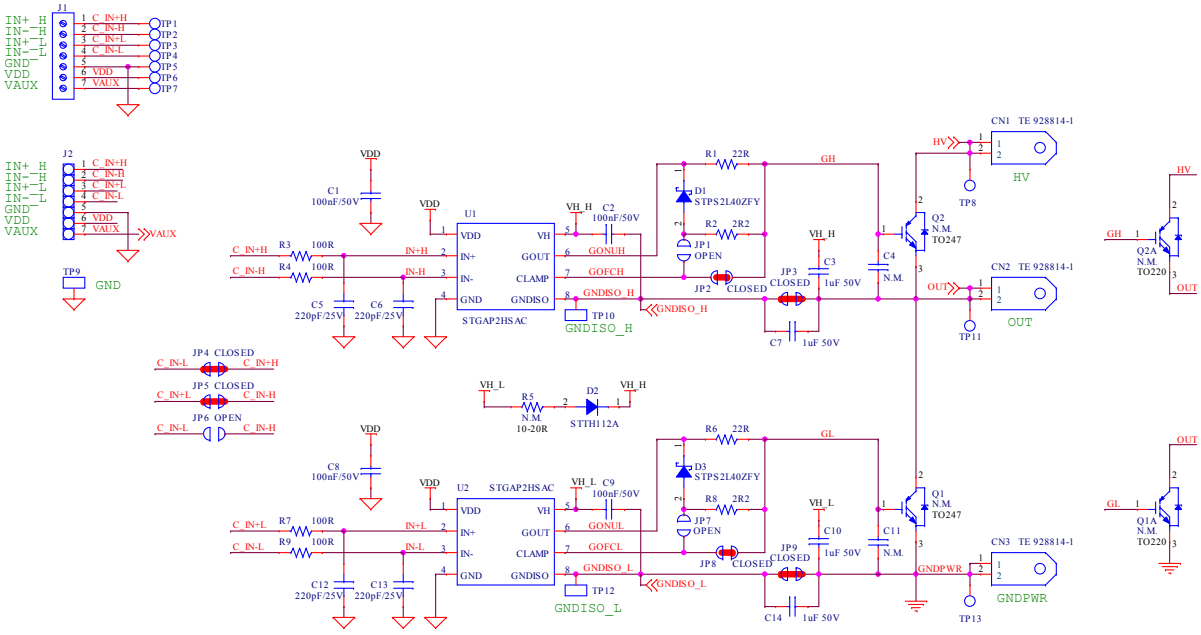
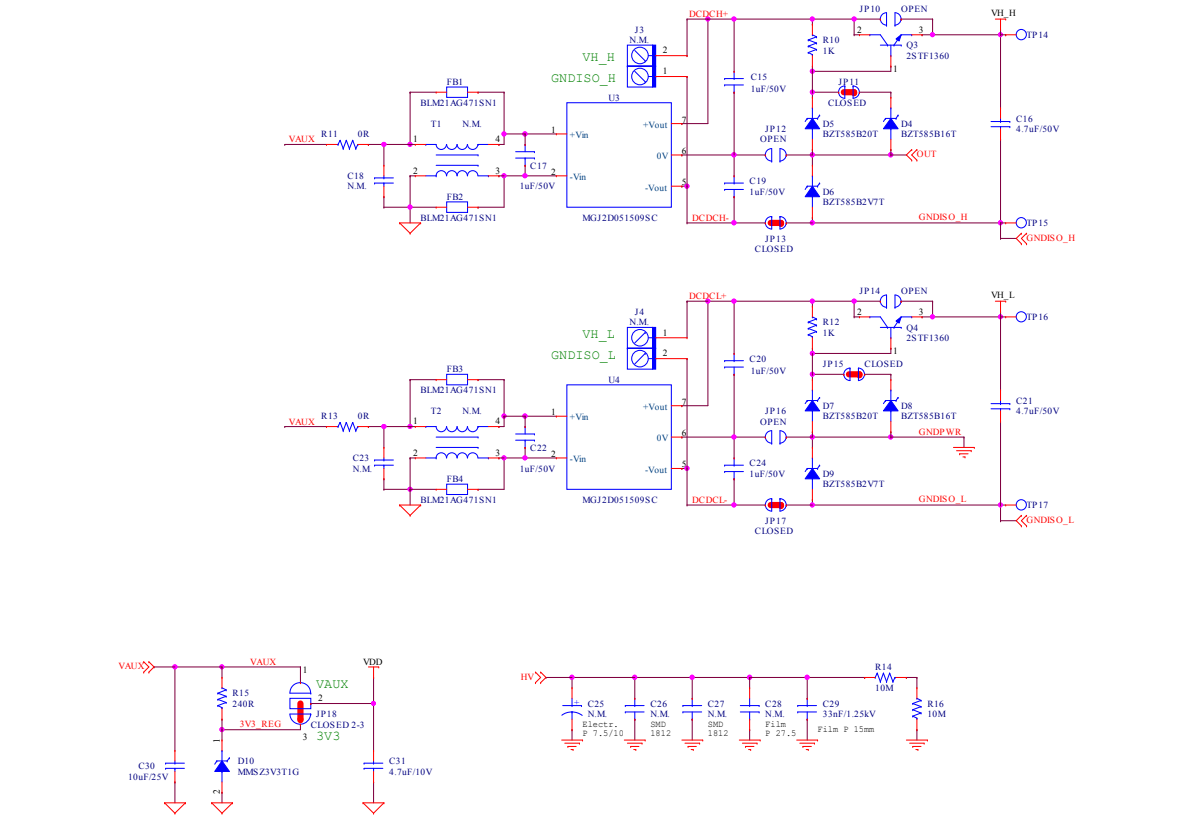


Figure 2. **EVALSTGAP2HSAC circuit schematic – supply, connectors and decoupling**



2 Bill of material

Table 1. **Bill of Material**

Part reference	Part description	Part value	Package / Manufacturer' code
CN1, CN2, CN3	Tab FASTON	TE 928814-1	Pitch 6.35 mm TE Connectivity
C1, C2, C8, C9	SMT ceramic capacitor	100 nF / 50 V	Size 0603
C3, C7, C10, C14	SMT ceramic capacitor	1 µF / 50 V	Size 0805
C4, C11	SMT ceramic capacitor	N.M.	Size 0805
C5, C6, C12, C13	SMT ceramic capacitor	220 pF / 25 V	Size 0603
C15, C17, C19, C20, C22, C24	SMT ceramic capacitor	1 µF / 50 V	Size 0603
C16, C21	SMT ceramic capacitor	4.7 µF / 50 V	Size 1206
C18, C23	SMT ceramic capacitor	N.M.	Size 0603
C25	THT electrolitic capacitor	N.M.	Radial p7.5/10 mm, d22 mm
C26, C27	SMT ceramic capacitor	N.M.	Size 1812
C28	Film capacitor	N.M.	Pitch 27.5 mm
C29	Film capacitor	33 nF / 1.25 kV	Pitch 15 mm Epcos
C30	SMT ceramic capacitor	10 µF / 25 V	Size 0805
C31	SMT ceramic capacitor	4.7 µF / 10 V	Size 0603
D1, D3	Automotive low drop power Schottky rectifier	STPS2L40ZFY	SOD123Flat STMicroelectronics
D2	High voltage ultrafast rectifier	STTH112A	SMA STMicroelectronics
D4, D8	Surface mount precision Zener diode	BZT585B16T	SOD523 Diodes incorporated
D5, D7	Surface mount precision Zener diode	BZT585B20T	SOD523 Diodes incorporated
D6, D9	Surface mount precision Zener diode	BZT585B2V7T	SOD523 Diodes incorporated
D10	Zener voltage regulator 500 mW	MMSZ3V3T1G	SOD123 ON semiconductor
FB1, FB2, FB3, FB4	Ferrite beads	BLM21AG471SN1	Size 0805 Murata
JP2, JP3, JP4, JP5, JP8, JP9, JP11, JP13, JP15, JP17	SMT jumper	Closed	Soldering pads
JP1, JP6, JP7, JP10, JP12, JP14, JP16	SMT jumper	Open	Soldering pads
JP18	SMT jumper	Closed 2-3	Soldering pads
J1	Screw connector	MORSV-350-7P_screw	7 poles, pitch 3.5 mm Würth Elektronik
J2	Strip connector	1x7 pins	Pitch 2.54 mm Amphenol FCI

Part reference	Part description	Part value	Package / Manufacturer' code
J3, J4	Screw connector	N.M.	2 poles, pitch 5.08 mm Phoenix contact
Q1, Q2	N-channel IGBT or MOSFET up to 1200 V	N.M.	TO-247
Q1A, Q2A	N-channel IGBT or MOSFET up to 1200 V	N.M.	TO-220
Q3, Q4	Low voltage fast-switching NPN power transistors	2STF1360	SOT-89 STMicroelectronics
R1, R6	SMT resistor	22 Ω	Size 1210
R2, R8	SMT resistor	2.2 Ω	Size 1210
R3, R4, R7, R9	SMT resistor	100 Ω	Size 0603
R5	SMT resistor	N.M.	Size 1206
R10, R12	SMT resistor	1 kΩ	Size 0603
R11, R13	SMT resistor	0 Ω	Size 0603
R14, R16	SMT resistor	10 MΩ	Size 1206
R15	SMT resistor	240 Ω	Size 0805
TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP11, TP13, TP14, TP15, TP16, TP17	Test point for probe	-	Metallized hole - 0.8 mm diameter
TP9, TP10, TP12	THT ring test point	-	1 mm Keystone
T1, T2	Common mode choke SMD	N.M.	4.7 x 4.5 mm
U1, U2	Automotive grade galvanically isolated 4 A single gate driver	STGAP2HSAC	SO-8W STMicroelectronics
U3, U4	5.2 kVDC isolated 2W gate driver DC-DC converters	MGJ2D051509SC	Murata

3 Layout and component placements

Figure 3. **EVALSTGAP2HSAC layout - component placement top view**

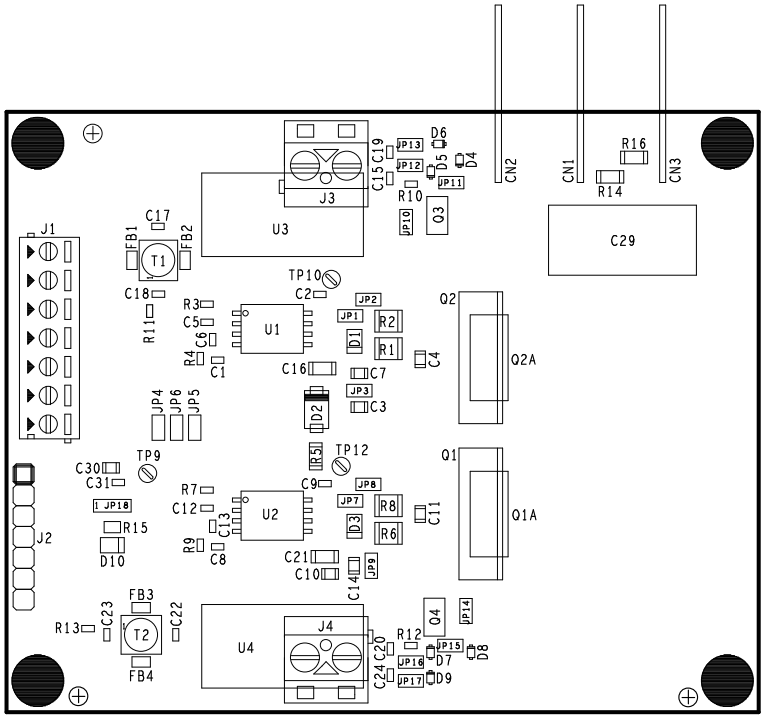


Figure 4. **EVALSTGAP2HSAC layout - component placement bottom view**

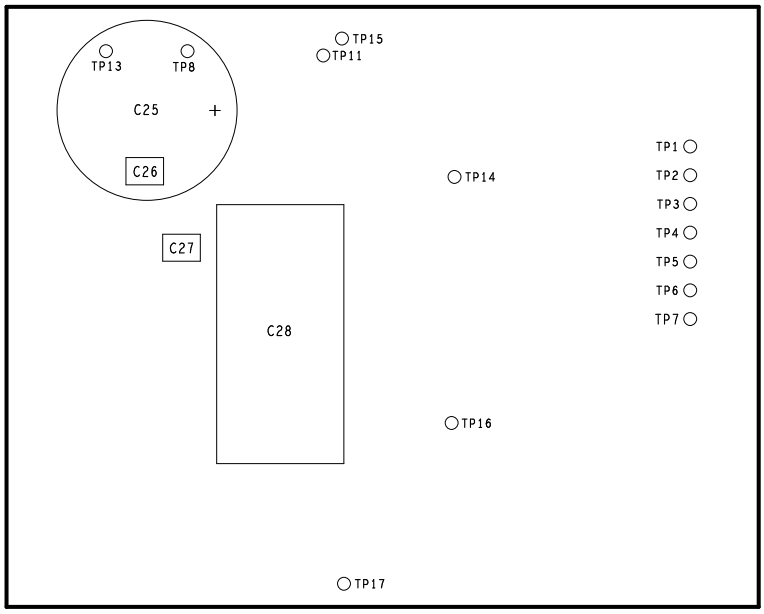


Figure 5. **EVALSTGAP2HSAC layout - top layer**

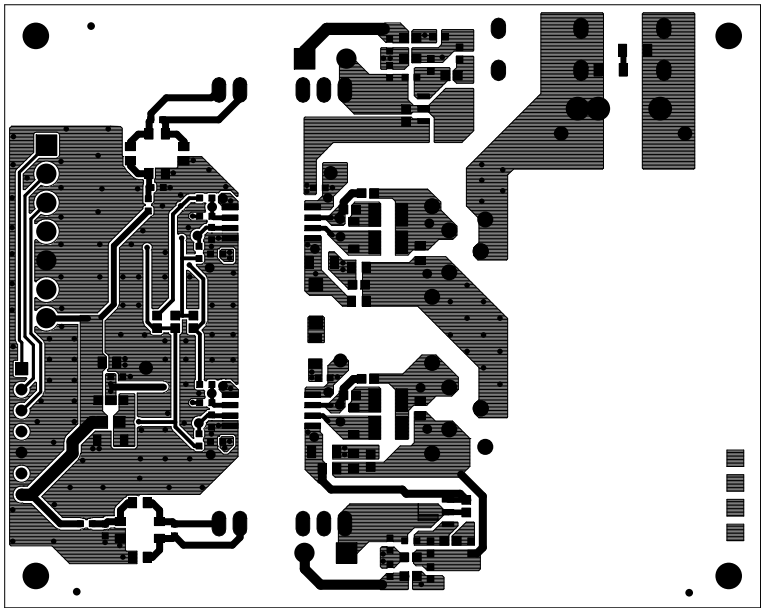
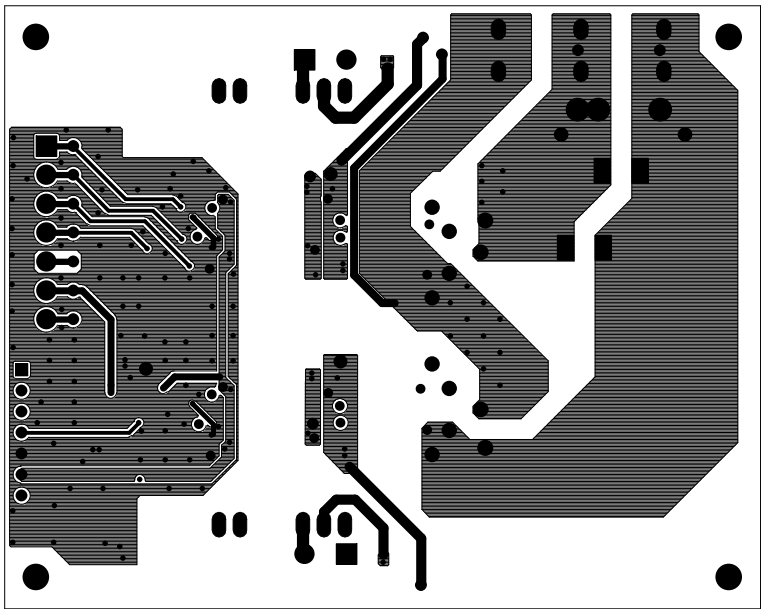


Figure 6. **EVALSTGAP2HSAC layout - bottom layer**



Revision history

Table 2. **Document revision history**

Date	Version	Changes
09-Sep-2025	1	Initial release.

Contents

List of tables

List of figures

IMPORTANT NOTICE – 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.

In the event of any conflict between the provisions of this document and the provisions of any contractual arrangement in force between the purchasers and ST, the provisions of such contractual arrangement shall prevail.

The 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 acknowledgment.

The 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 the 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.

If the purchasers identify an ST product that meets their functional and performance requirements but that is not designated for the purchasers' market segment, the purchasers shall contact ST for more information.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, refer to 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.