

Demonstration board for STGAP2SICSN isolated 4 A single gate driver



Features

- **Board**
 - Half bridge configuration, high voltage rail up to 520 V
 - SCTH35N65G2V-7: 650 V, 55 mΩ 2nd generation SiC MOSFET
 - Negative gate driving
 - On-board isolated DC-DC converters to supply high-side and low-side gate drivers, fed by VAUX = 5 V, with 5.2 kV maximum isolation
 - VDD logic supplied by on-board generated 3.3 V or VAUX = 5 V
 - Easy jumper selection of driving voltage configuration: +17/0 V; +17/-3 V; +19/0 V; +19/-3 V
- **Device**
 - 1700 V functional isolation
 - Driver current capability: 4 A source/sink @ 25 °C
 - Separate sink and source output for easy gate driving configuration
 - Short propagation delay: 75 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

Product status link
EVSTGAP2SICSN

Description

The [EVSTGAP2SICSN](#) is a half-bridge evaluation board designed to evaluate the STGAP2SICSN 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 SiC power switch.

The separated source and sink outputs allow to independently optimize turn-on and turn-off by using dedicated gate resistors.

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 implementing HW interlocking protection to avoid cross-conduction in case of controller's malfunction.

The device allows implementing negative gate driving, and the on-board isolated DC-DC converters allow working with optimized driving voltage for SiC.

The EVSTGAP2SICSN board allows evaluating all the STGAP2SICSN features while driving a half-bridge power stage with voltage rating up to 520 V. It is possible to increase bus voltage by replacing the power switches with appropriate devices in H2PACK-7L or H2PACK-2L package and the C29 capacitance if needed.

The board components are easy to access and modify to make driver performance evaluation easier under different application conditions and fine adjustment of final application components.

1 Schematic diagram

Figure 1. EVSTGAP2SICSN circuit schematic – gate drivers

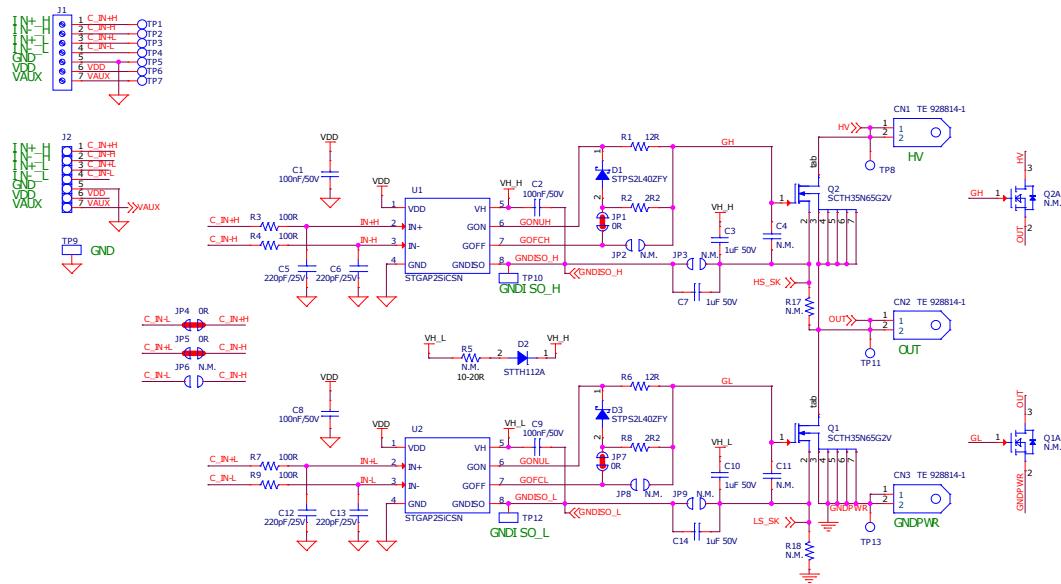
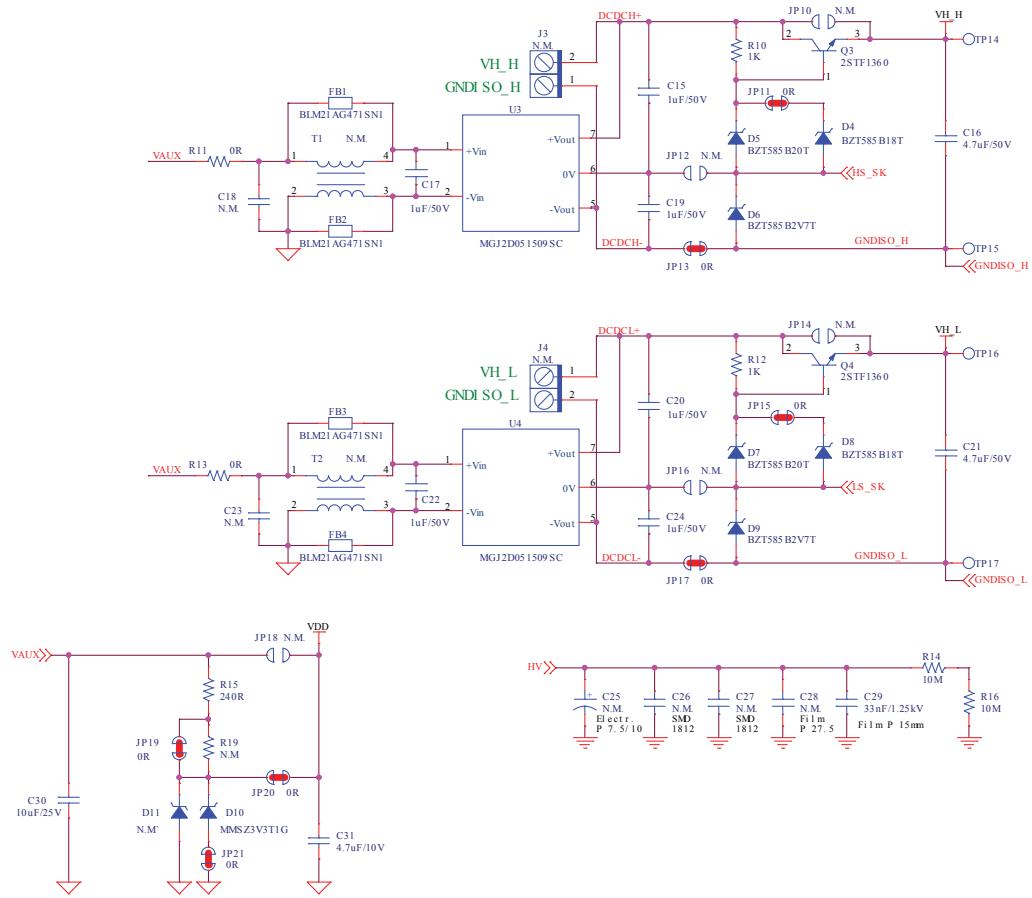


Figure 2. EVSTGAP2SICSN circuit schematic – supply, connectors and decoupling



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Bill of material

Table 1. EVSTGAP2SICSN bill of material

Part Reference	Part Value	Part Description
CN1, CN2, CN3	TE 928814-1	Tab FASTON - Pitch 5.08 mm
C1, C2, C8, C9	100 nF / 50 V	SMT ceramic capacitor - Size 0603
C3, C7, C10, C14	1 µF / 50 V	SMT ceramic capacitor - Size 0805
C4, C11	N.M.	SMT ceramic capacitor - Size 0805
C5, C6, C12, C13	220 pF / 25 V	SMT ceramic capacitor - Size 0603
C15, C17, C19, C20, C22, C24	1 µF / 50 V	SMT ceramic capacitor - Size 0603
C16, C21	4.7 µF / 50 V	SMT ceramic capacitor - Size 1206
C18, C23	N.M.	SMT ceramic capacitor - Size 0603
C25	N.M.	THT electrolytic capacitor - Radial p7.5/10 d22
C26, C27	N.M.	SMT ceramic capacitor - Size 1812
C28	N.M.	Film capacitor - Pitch 27.5 mm
C29	33 nF / 1.25 kV	Film capacitor - Pitch 15 mm
C30	10 µF / 25 V	SMT ceramic capacitor - Size 0805
C31	4.7 µF / 10 V	SMT ceramic capacitor - Size 0603
D1, D3	STPS2L40ZFY	Schottky rectifier - SOD123Flat
D2	STTH112A	High voltage rectifier - SMA
D4, D8	BZT585B18T	Surface mount precision Zener diode - SOD523
D5, D7	BZT585B20T	Surface mount precision Zener diode - SOD523
D6, D9	BZT585B2V7T	Surface mount Zener diode - SOD523
D10	MMSZ3V3T1G	Zener voltage regulator - SOD123
D11	N.M.	Zener voltage regulator - SOD123
FB1, FB2, FB3, FB4	BLM21AG471SN1	Ferrite beads - Size 0805
JP1, JP7	CLOSED	SMT jumper - Size 0402
JP2, JP3, JP8, JP9	OPEN	SMT jumper - Size 0402
JP4, JP5, JP11, JP13, JP15, JP17, JP19, JP20, JP21	CLOSED	SMT jumper - Size 0402
JP6, JP10, JP12, JP14, JP16, JP18	OPEN	SMT jumper - Size 0402
J1	MORSV-350-7P_screw	7 poles, Pitch 3.5 mm
J2	Pin strip	Connector header block T.H. 2 POS 2.54 mm
J3, J4	N.M.	Connector header block T.H. 2 POS 5.08 mm
Q1A, Q2A	N.M.	H2PAK-2
Q1, Q2	SCTH35N65G2V-7	Silicon carbide power MOSFET, 650V, 55mΩ 45 A - H2PAK-7
Q3, Q4	2STF1360	Low voltage fast-switching NPN power transistor - SOT-89

Part Reference	Part Value	Part Description
R1, R6	12 Ω	SMT resistor - Size 1210
R2, R8	2.2 Ω	SMT resistor - Size 1210
R3, R4, R7, R9	100 Ω	SMT resistor - Size 0603
R5	N.M.	SMT resistor - Size 1206
R10, R12	1 kΩ	SMT resistor - Size 0603
R11, R13	0 Ω	SMT resistor - Size 0603
R14, R16	10 MΩ	SMT resistor - Size 1206
R15	240 Ω	SMT resistor - Size 0805
R17, R18	N.M.	SMT resistor - Size 0603
R19	N.M.	SMT resistor - Size 0805
TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP11, TP13, TP14, TP15, TP16, TP17	Test point	Pad test point, SMD
TP9, TP10, TP12	Test point	Loop test point, THT
T1, T2	N.M.	Common mode choke - SMD 4.7x4.5 mm
U1, U2	STGAP2SICSN	Galvanically isolated gate driver for SiC MOSFETs - SO-8
U3, U4	MGJ2D051509SC	5 V to +15/-9 V Isolated DC-DC converter Murata

3 Layout and component placements

Figure 3. EVSTGAP2SICSN – Layout (component placement top view)

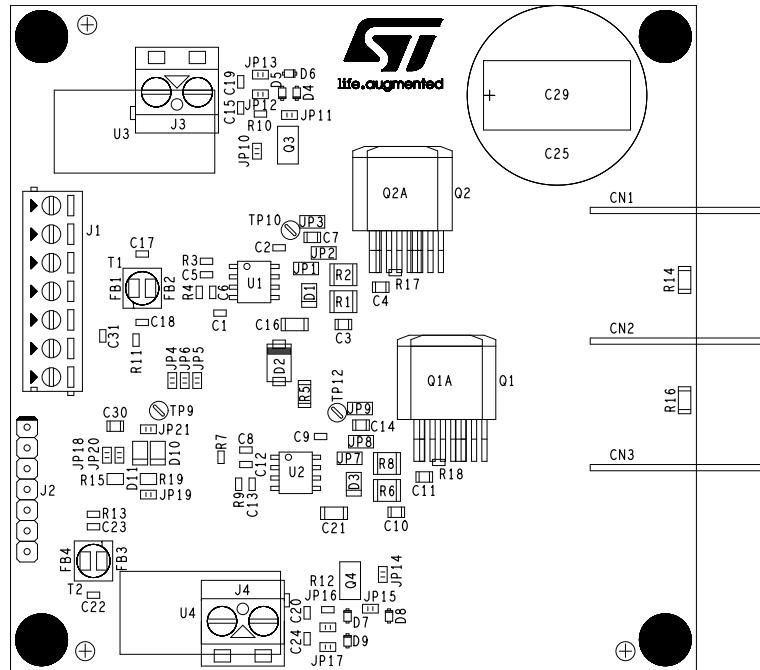


Figure 4. EVSTGAP2SICSN – Layout (component placement bottom view)

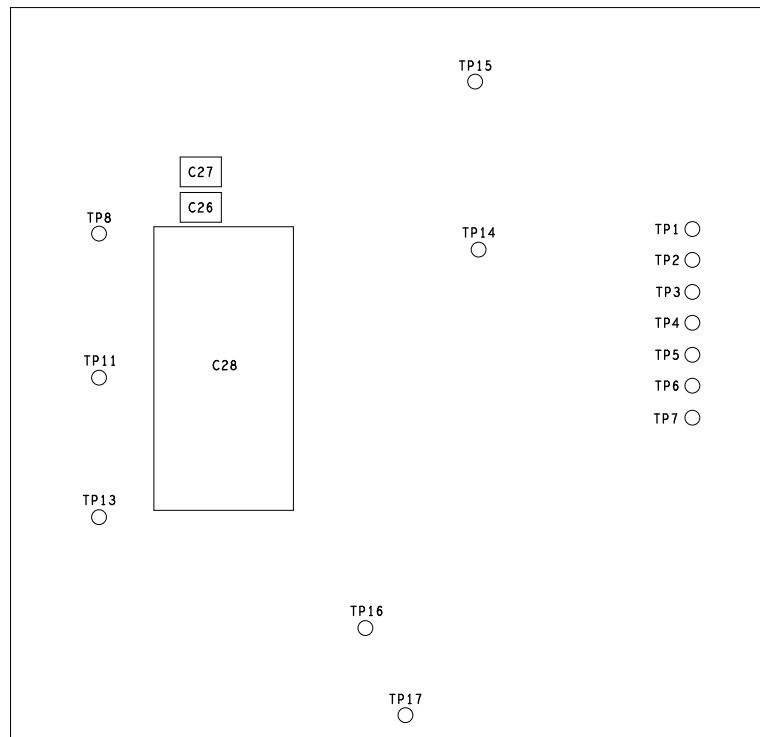


Figure 5. EVSTGAP2SICSN – Layout (top layer)

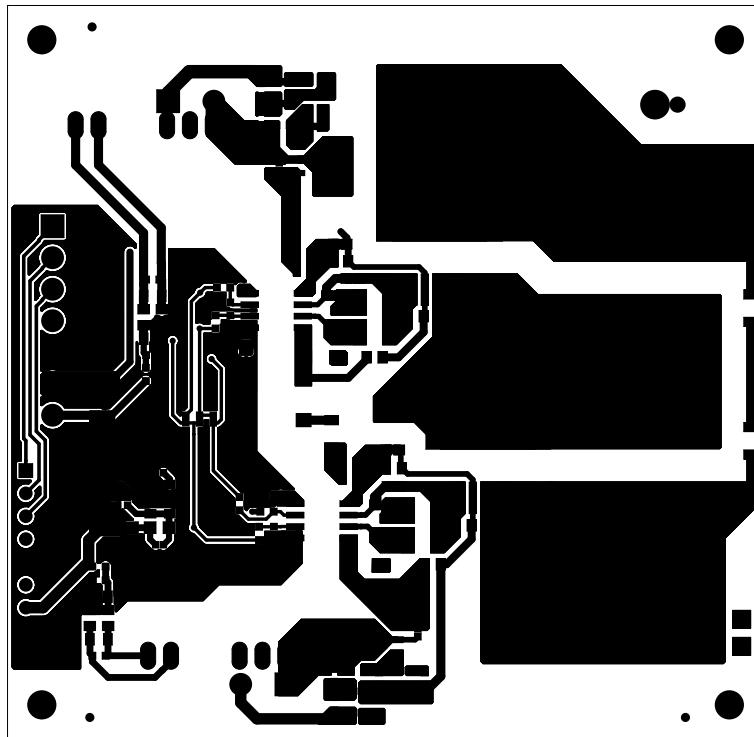
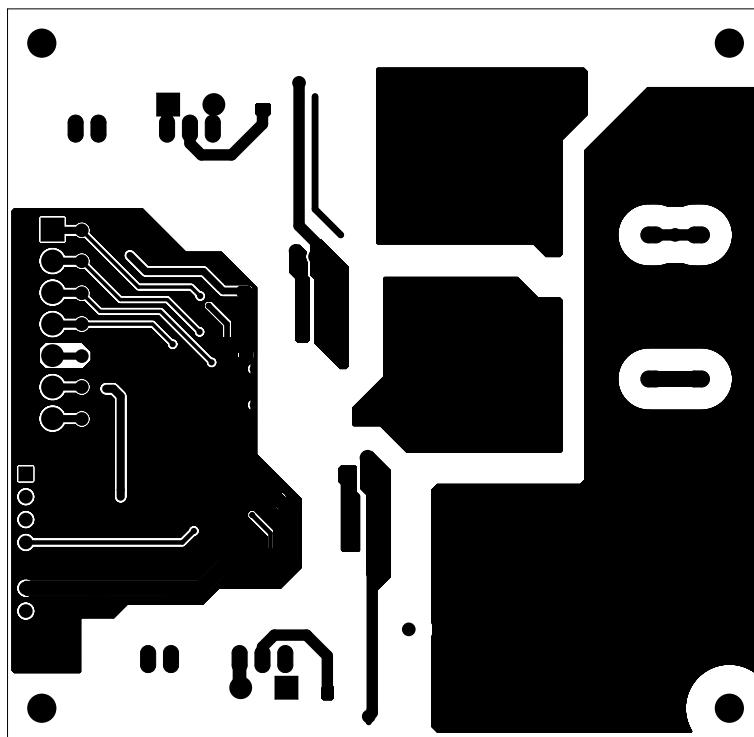


Figure 6. EVSTGAP2SICSN – Layout (bottom layer)



Revision history

Table 2. Document revision history

Date	Version	Changes
13-Aug-2021	1	Initial release.
06-Dec-2022	2	Updated Table 1 and Figure 2

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