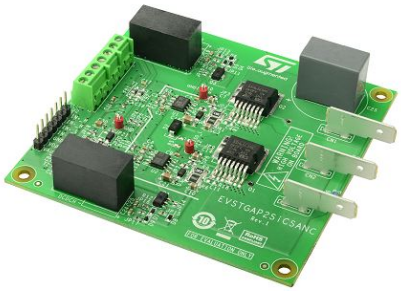
EVSTGAP2SICSANC

Data brief

Demonstration board for STGAP2SICSANC isolated single gate driver



Product status link

EVSTGAP2SICSANC

Features

- **Board**
  - Half bridge configuration, high voltage rail up to 520 V
  - SCT055H65G3AG: 650 V, 58 mΩ typ., 30 A 3rd 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**
  - AEC-Q100 qualified
  - High voltage rail up to 1700 V
  - Driver current capability: 4 A source/sink @ 25 °C
  - 4 A Miller CLAMP
  - Overall input-output propagation delay: 45 ns
  - UVLO function
  - Gate driving voltage up to 26 V
  - 3.3 V, 5 V TTL/CMOS inputs with hysteresis
  - Temperature shut down protection
  - UL 1577 recognized

Description

The EVSTGAP2SICSANC is a half bridge evaluation board designed to evaluate the STGAP2SICSANC 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 mid and high power inverter applications such as motor drivers in industrial applications equipped with SiC MOSFET power switch.

The device has a single output pin and Miller CLAMP function that prevents gate spikes during fast commutations in half-bridge topologies. This configuration provides high flexibility and bill of material reduction for external components.

The device integrates protection functions: UVLO with optimized value for SiC MOSFETs and thermal shut down are included to easily design high reliability systems. Dual input pins allow the selection of signal polarity control and implementation of HW interlocking protection to avoid cross-conduction in case of controller 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 EVSTGAP2SICSANC board allows evaluating all the STGAP2SICSANC 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 H^2PACK-7L or H^2PACK-2L or HU3PAK 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. Circuit schematic – gate drivers

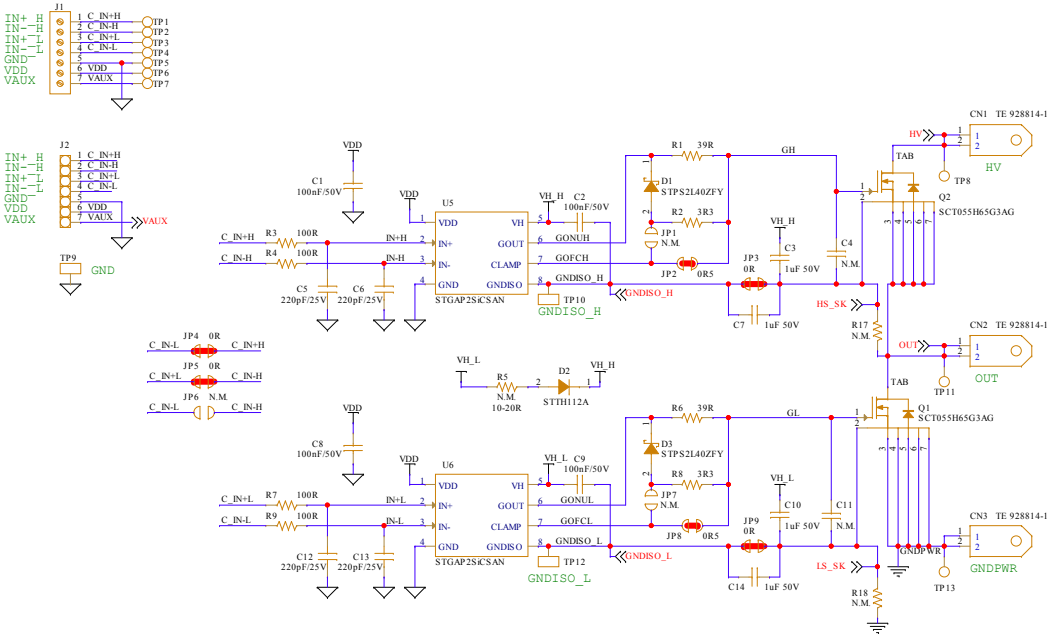
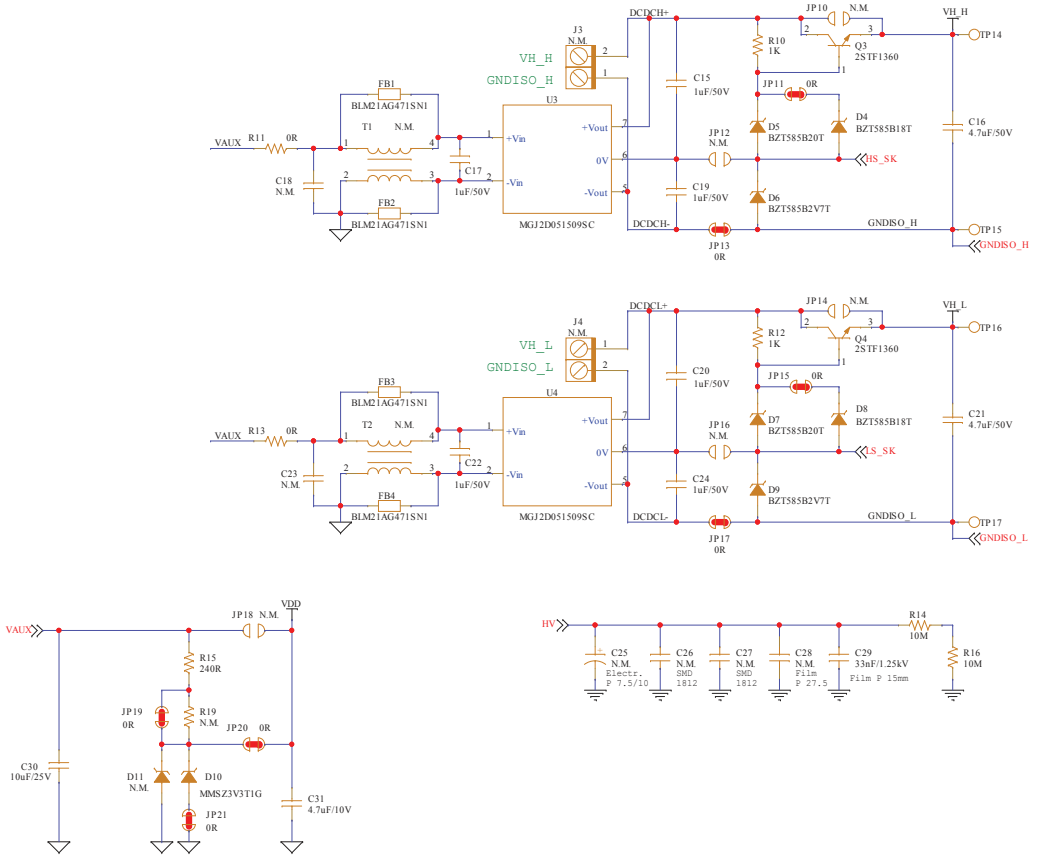


Figure 2. Circuit schematic – supply, connectors and decoupling



2 Bill of material

Table 1. Bill of material

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	Automotive 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	OPEN	SMT jumper - Size 0402
JP2, JP8	0.5 Ω	SMT resistor - Size 0402
JP3, JP9	CLOSED	SMT jumper - Size 0402
JP4, JP5, JP11, JP13, JP15, JP17, JP19, JP20, JP21	CLOSED	SMT jumper - Size 0402
JP6, JP10, JP12, JP14, JP16, JP18	N.M.	SMT jumper - Size 0402
J1	MORSV-350-7P_screw	Screw connector 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
Q1, Q2	SCT055H65G3AG	Silicon carbide power MOSFET, 650V, 58 mΩ 30 A - H^2PAK-7L H^2PAK-7L or HU3PAK
Q3, Q4	2STF1360	Low voltage fast-switching NPN power transistor - SOT-89

Reference	Part Value	Part Description
R1, R6	39 Ω	SMT resistor - Size 1210
R2, R8	3.3 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	STGAP2SICSANC	Isolated gate driver for SiC MOSFETs - SO-8
U3, U4	MGJ2D051509SC	5.2 kV Isolated DC-DC converter Murata

3 Layout and component placements

Figure 3. **Layout - Components placement top**

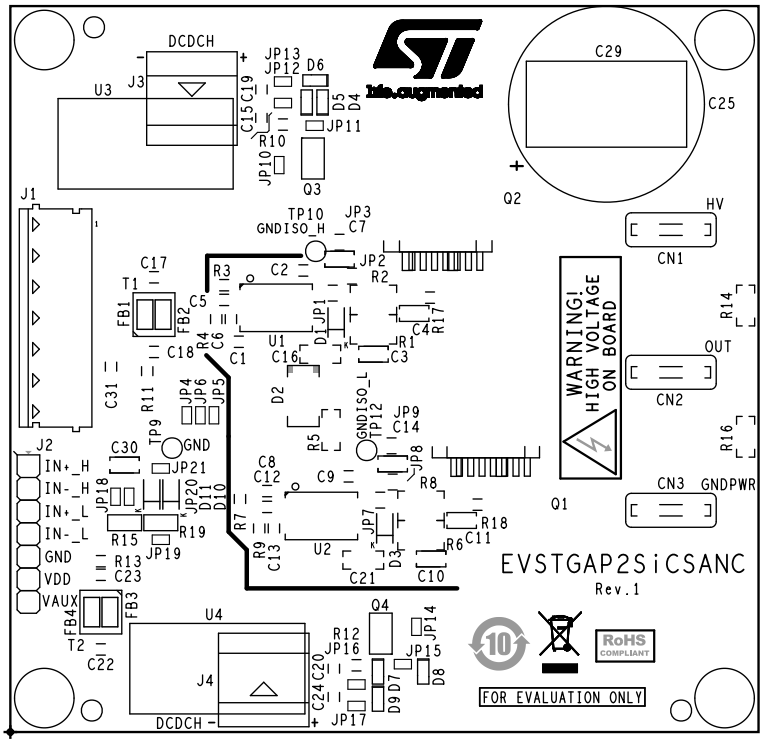


Figure 4. **Layout - Components placement bottom**

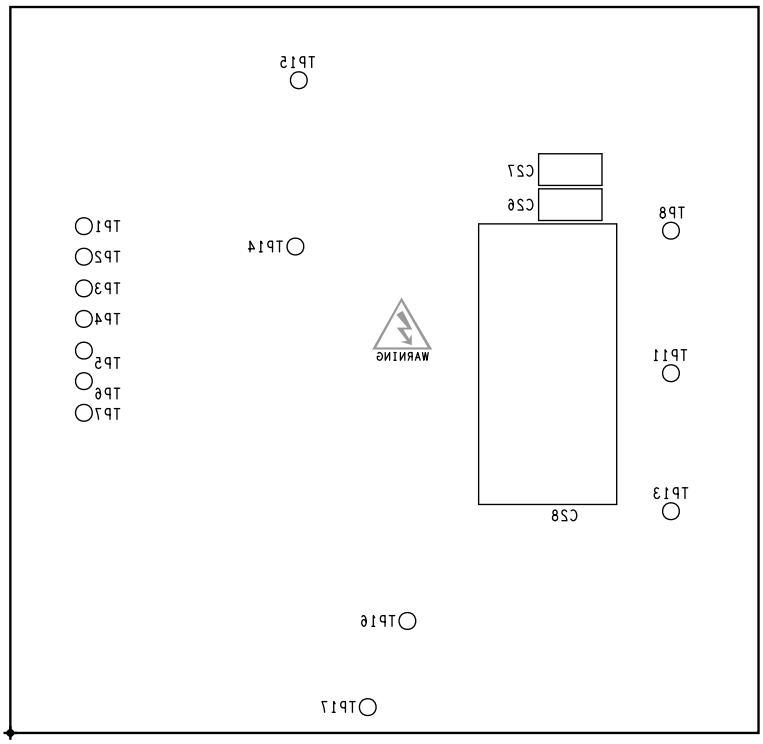


Figure 5. Layout - Top layer

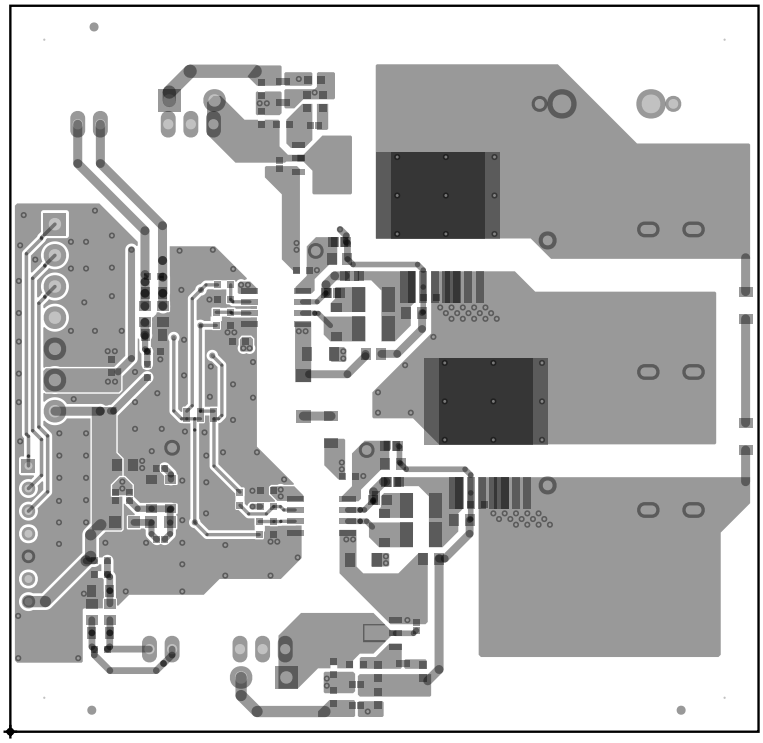
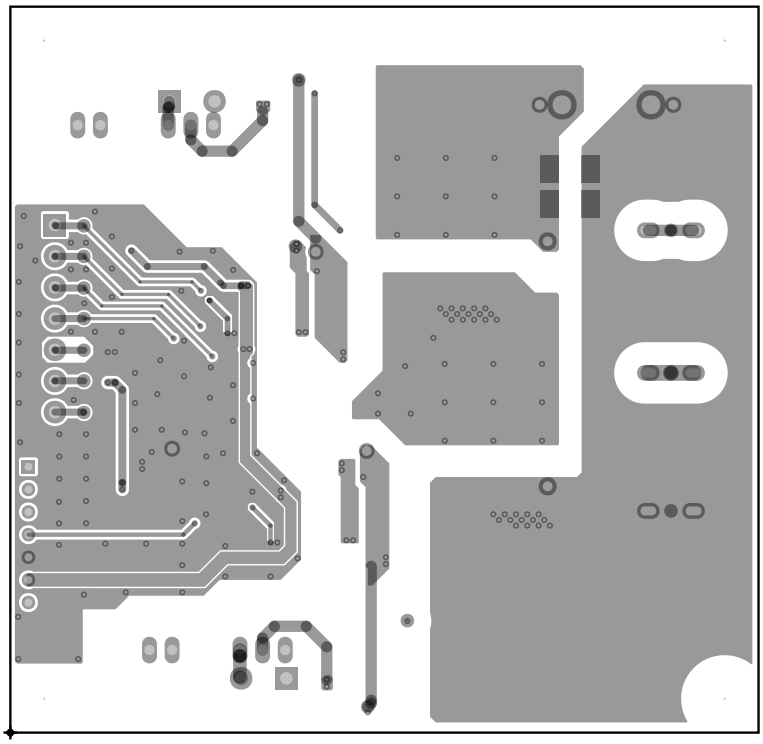


Figure 6. Layout - Bottom layer



Revision history

Table 2. **Document revision history**

Date	Version	Changes
26-May-2023	1	Initial release.

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