EVALSTGAP2SM

Demonstration board for STGAP2SM isolated 4 A single gate driver

Data brief

Features

- High voltage rail up to 1700 V
- Driver current capability:
  - 4 A source/sink at 25 °C
- Separate sink and source for simplified gate driving configuration (STGAP2SM)
- 4 A Miller clamp (STGAP2SCM)
- Short propagation delay: 100 ns
- UVLO function
- Gate driving voltage up to 26 V
- Negative gate driving
- On-board isolated DC-DC converters to supply gate drivers, fed by VAUX = 5 V
- VDD logic supply local 3.3 V or VAUX
- 3.3 V, 5 V TTL/CMOS inputs with hysteresis
- Easy jumper selection of driving voltage configuration:
  - +15/0 V; +15/-3 V; +19/0 V; +19/-3 V
- Temperature shutdown protection

Description

The STGAP2SM is an 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/SiC power switch.

Two different variants are available: one with separated source and sink outputs, the other with single output pin and a dedicated pin for Miller clamp function. The EVALSTGAP2S is suitable for both output configuration variants.

The device integrates protection functions: UVLO and thermal shutdown are included to simplify the design of 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 malfunction.

The device allows the implementation of negative gate driving, and the on-board isolated DC-DC converters allow working with optimized driving voltage for MOSFET/IGBT or SiC.

The EVALSTGAP2S board allows evaluating all the STGAP2SM features while driving a half-bridge power stage with voltage rating up to 1700 V in TO-220 or TO-247 package.

The board facilitates the selection and modification of the values of relevant external components in order to ease driver's performance evaluation under different applicative conditions and fine pre-tuning of final application components.

Contents

1 Schematic diagrams

Figure 1. EVALSTGAP2SM schematic - gate driver with separate outputs (STGAP2SM)

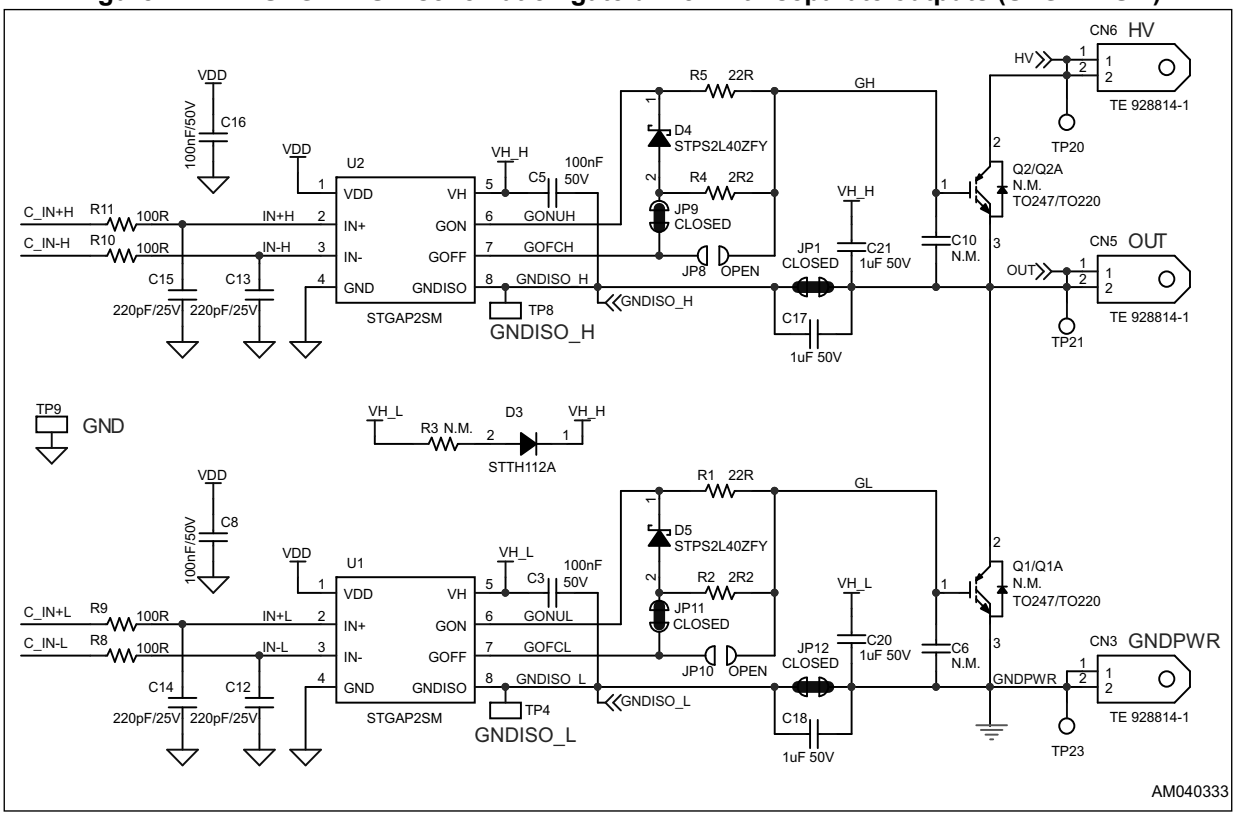


Figure 2. EVALSTGAP2SCM schematic - gate driver with single output and Miller clamp (STGAP2SCM)

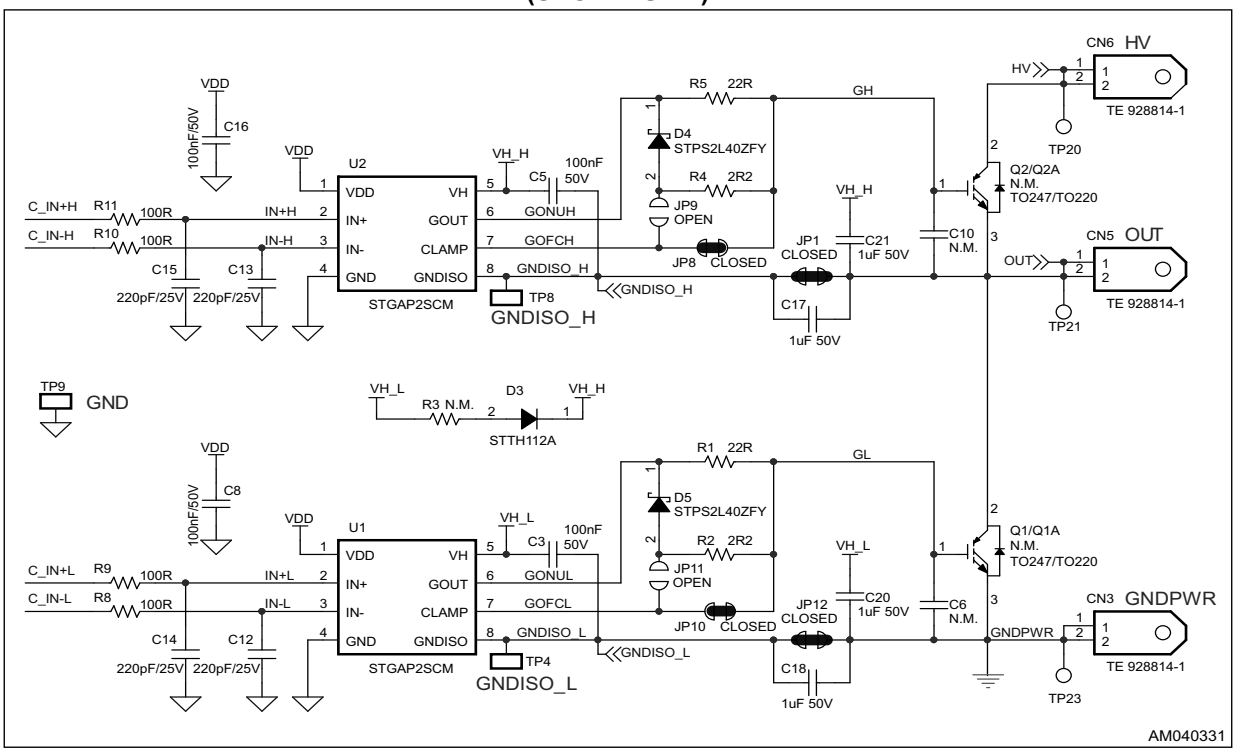
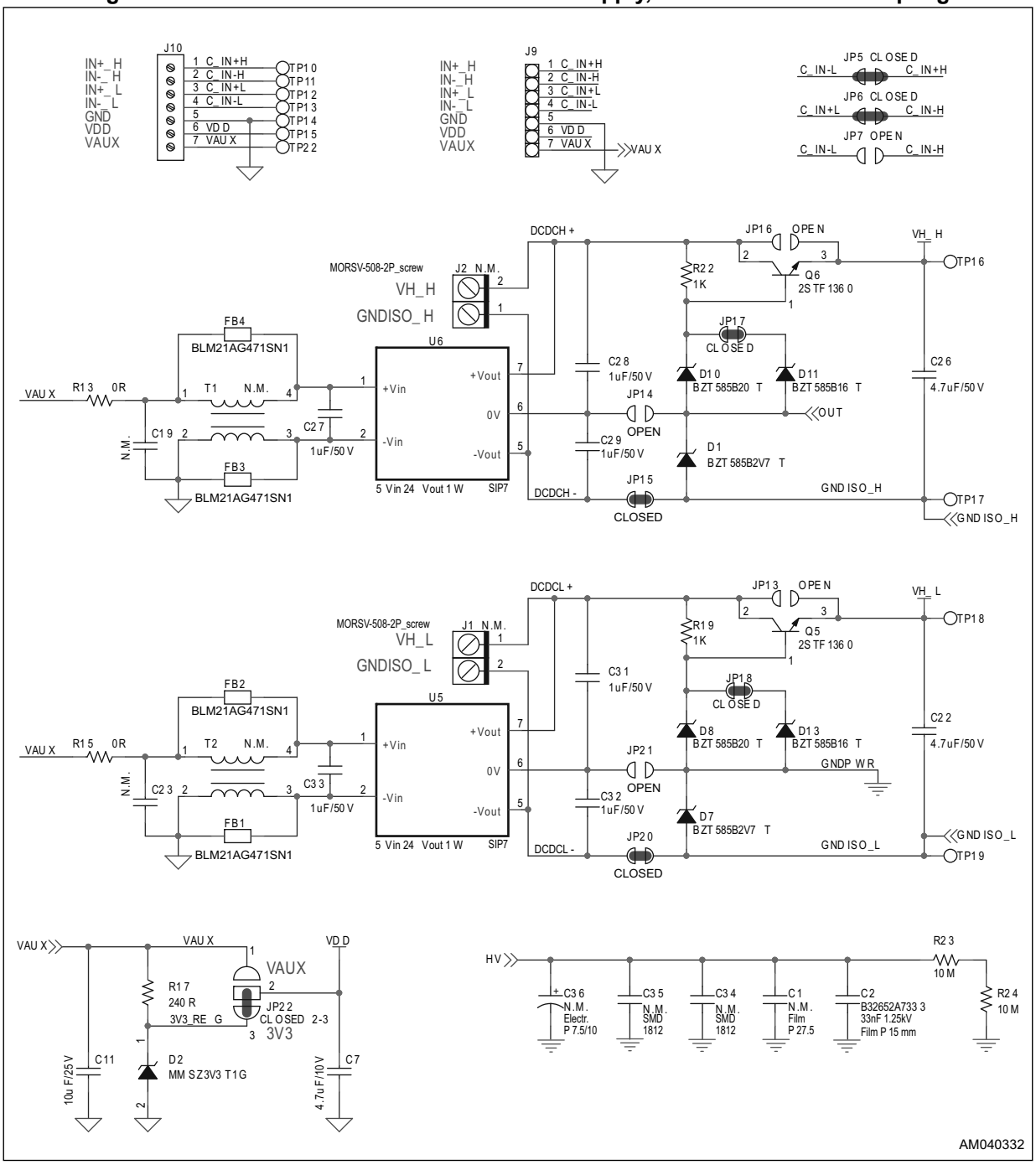


Figure 3. EVALSTGAP2SM circuit schematic - supply, connectors and decoupling



2 Bill of material

Table 1. Bill of material

Part reference	Part value		Part description
	EVALSTGAP2SM	EVALSTGAP2SCM	
CN3, CN5, CN6	TE 928814-1		FASTON 6.35 mm TAB
C1	N.M.		Film capacitor, 27.5 mm pitch
C2	33 nF / 1.25 kV		Film capacitor, 15 mm pitch
C3, C5, C8, C16	100 nF / 50 V		Ceramic capacitor, SMT 0603
C6, C10	N.M.		Ceramic capacitor, SMT 0805
C7	4.7 µF / 16 V		Ceramic capacitor, SMT 0603
C11	10 µF / 25 V		Ceramic capacitor, SMT 0805
C12, C13, C14, C15	220 pF / 25 V		Ceramic capacitor, SMT 0603
C17, C18, C20, C21	1 µF / 50 V		Ceramic capacitor, SMT 0805
C19, C23	N.M.		Ceramic capacitor, SMT 0603
C22, C26	4.7 µF / 50 V		Ceramic capacitor, SMT 1206
C27, C28, C29, C31, C32, C33	1 µF / 50 V		Ceramic capacitor, SMT 0603
C34, C35	N.M.		Ceramic capacitor, SMT 1812
C36	N.M.		Electrolytic capacitor diam. 22 mm, pitch 7.5/10 mm
D1, D7	BZT585B2V7T		Zener diode 2.7 V, SOD-523
D2	MMSZ3V3T1G		Zener diode 3.3 V, SOD-123
D3	STTH112A		HV ultrafast diode 1200 V, 1 A, SMA
D4, D5	STPS2L40ZFY		Schottky diode 40 V, 2 A, SOD-123
D8, D10	BZT585B20T		Zener diode 20 V, SOD-523
D11, D13	BZT585B16T		Zener diode 16 V, SOD-523
FB1, FB2, FB3, FB4	BLM21AG471SN1		Ferrite Bead 470 Ω, SMT 0805
JP1, JP5, JP6, JP12, JP15, JP17, JP18, JP20	CLOSED		SMT jumper
JP7, JP13, JP14, JP16, JP21	OPEN		SMT jumper
JP9, JP11	CLOSED	OPEN	SMT jumper
JP8, JP10	OPEN	CLOSED	SMT jumper
JP22	CLOSED 2-3		SMT jumper
J1, J2	N.M.		Connector header block T.H. 2 POS 5.08 mm
J9	PIN strip		Strip connector header 7 POS 2.54 mm

Table 1. Bill of material (continued)

Part reference	Part value		Part description
	EVALSTGAP2SM	EVALSTGAP2SCM	
J10	WE 691243110007 or similar		Connector header block T.H. 6 POS 3.5 mm
Q1, Q2	To be selected by customer		N-channel IGBT or MOSFET up to 1700 V TO-247 (or TO-220)
Q5, Q6	BCX56		Transistor NPN, SOT-89
R1, R5	22 Ω		Chip resistor, SMT 1210
R2, R4	2.2 Ω		Chip resistor, SMT 1210
R3	N.M.		Chip resistor, SMT 1206
R8, R9, R10, R11	100 Ω		Chip resistor, SMT 0603
R13, R15	0 Ω		Chip resistor, SMT 0603
R17	240 Ω		Chip resistor, SMT 0805
R19, R22	1 kΩ		Chip resistor, SMT 0603
R23, R24	10 MΩ		Chip resistor, SMT 1206
TP4, TP8, TP9	Test point		Loop test point, THT
TP10, TP11, TP12, TP13, TP14, TP15, TP16, TP17, TP18, TP19, TP20, TP21, TP22, TP23	Test point		Pad test point, SMD
T1, T2	N.M.		Common mode choke TDK ACM4520, SMD 4.7 x 4.5 mm
U5, U6	MGJ2D051509SC		5 V to +15/-9 V Isolated DC-DC converter, Murata
U1, U2	STGAP2SM	STGAP2SCM	Isolated 4 A single gate driver, SO8

3 Layout and component placements

Figure 4. EVALSTGAP2SM - layout (component placement top view)

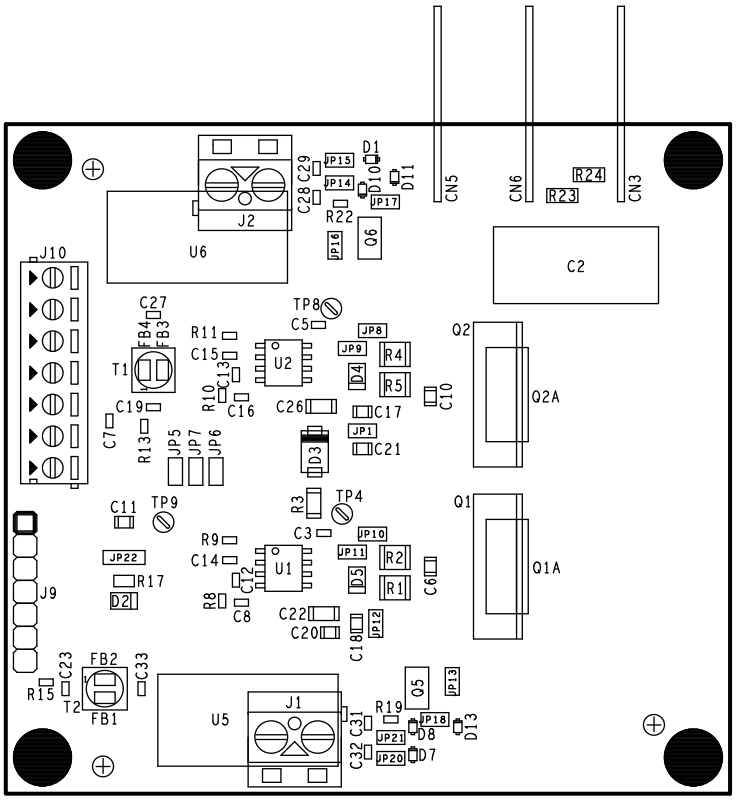


Figure 5. EVALSTGAP2SM - layout (component placement bottom view)

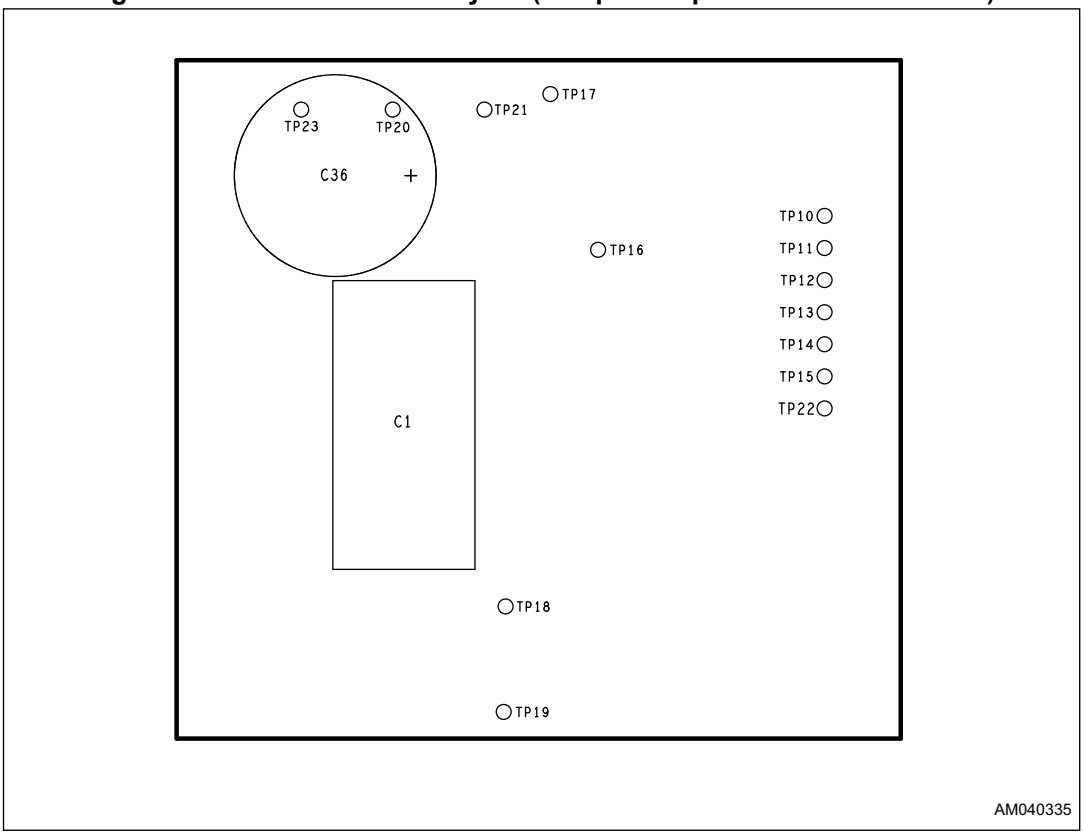


Figure 6. EVALSTGAP2SM - layout (top layer)

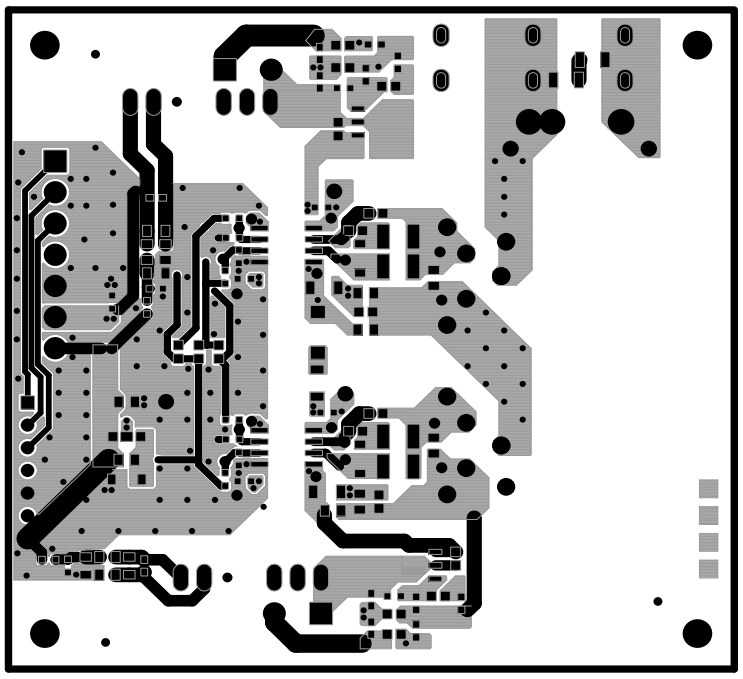


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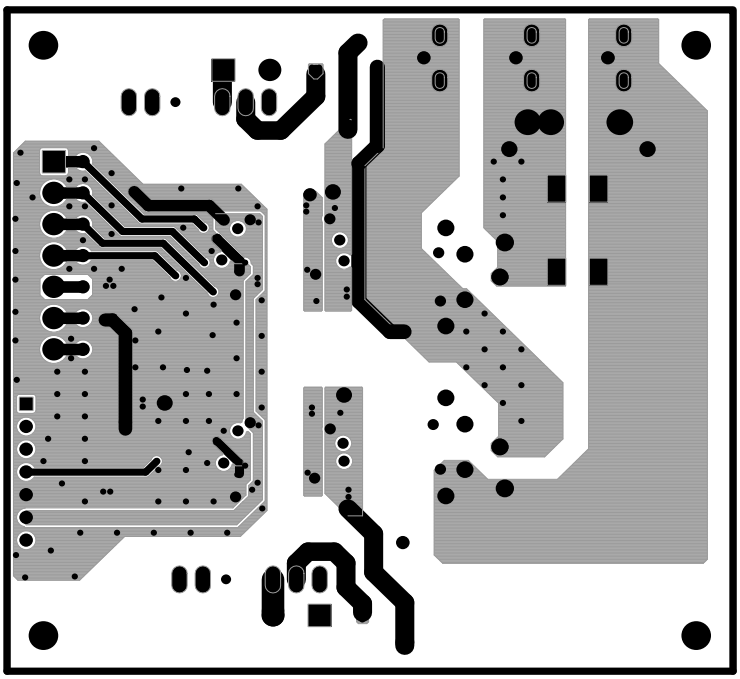
Figure 7. EVALSTGAP2SM - layout (bottom layer)



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4 Revision history

Table 2. Document revision history

Date	Revision	Changes
26-Oct-2018	1	Initial release.

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