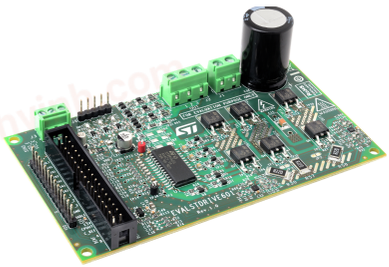
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EVALSTDRIVE601

Data brief

Demonstration board for STDRIVE601 triple gate driver



Features

- High voltage rail up to 600V
- Driver supply input voltage range 9V-20V
- STGD6M65DF2 IGBTs power stage featuring:
  - $V_{(BR)CES}$ = 650 V
  - $V_{CE(sat)}$ = 1.55 V @ I_C = 6 A
- Dual footprint for IGBT/MOSFET package:
  - DPAK
  - PowerFlat 8x8
- Selectable single or 3-shunt current sensing topology:
  - Sensored or sensorless BEMF detection
  - FOC or 6-Step algorithm
- SmartShutdown overcurrent protection
- Hall effect sensors connector
- Bus voltage sensing
- 450V bulk capacitor
- Connector for interfacing with MCU
- RoHS compliant

Product status link
EVALSTDRIVE601

Application

- Three-phase motor drives
- Fans
- Pumps
- Refrigerator compressors
- Industrial inverters
- Appliances

Description

The EVALSTDRIVE601 demonstration board is a complete 3-phase inverter which allows evaluating all of the STDRIVE601 features. The power stage features STGD6M65DF2 IGBTs, but can be populated with any IGBT or power MOSFET in DPAK or powerFLAT 8x8 HV package. The board is designed to support a three shunt or a single shunt current sensing topology.

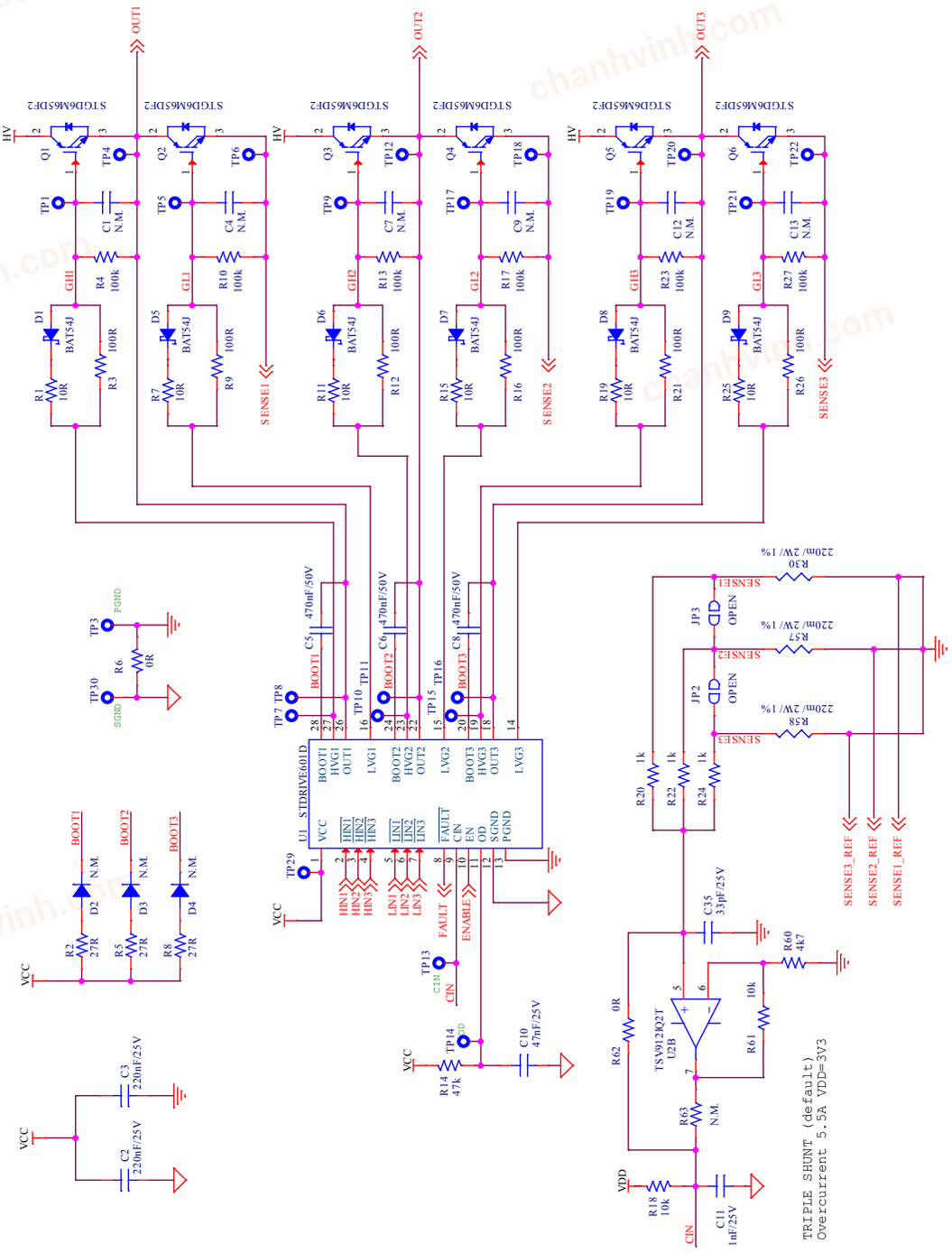
A strip connector allows an easy interfacing with MCU control.

The STDRIVE601 is a 600V gate driver device manufactured with BCD6s offline technology. It is a single-chip with three half-bridge gate drivers for N-channel power MOSFETs or IGBTs suitable for 3-phase applications.The device integrates three bootstrap diodes and a smart shutdown feature able to detect very fast overcurrent condition, minimizing the propagation delay between the overcurrent event and the output switch-off.

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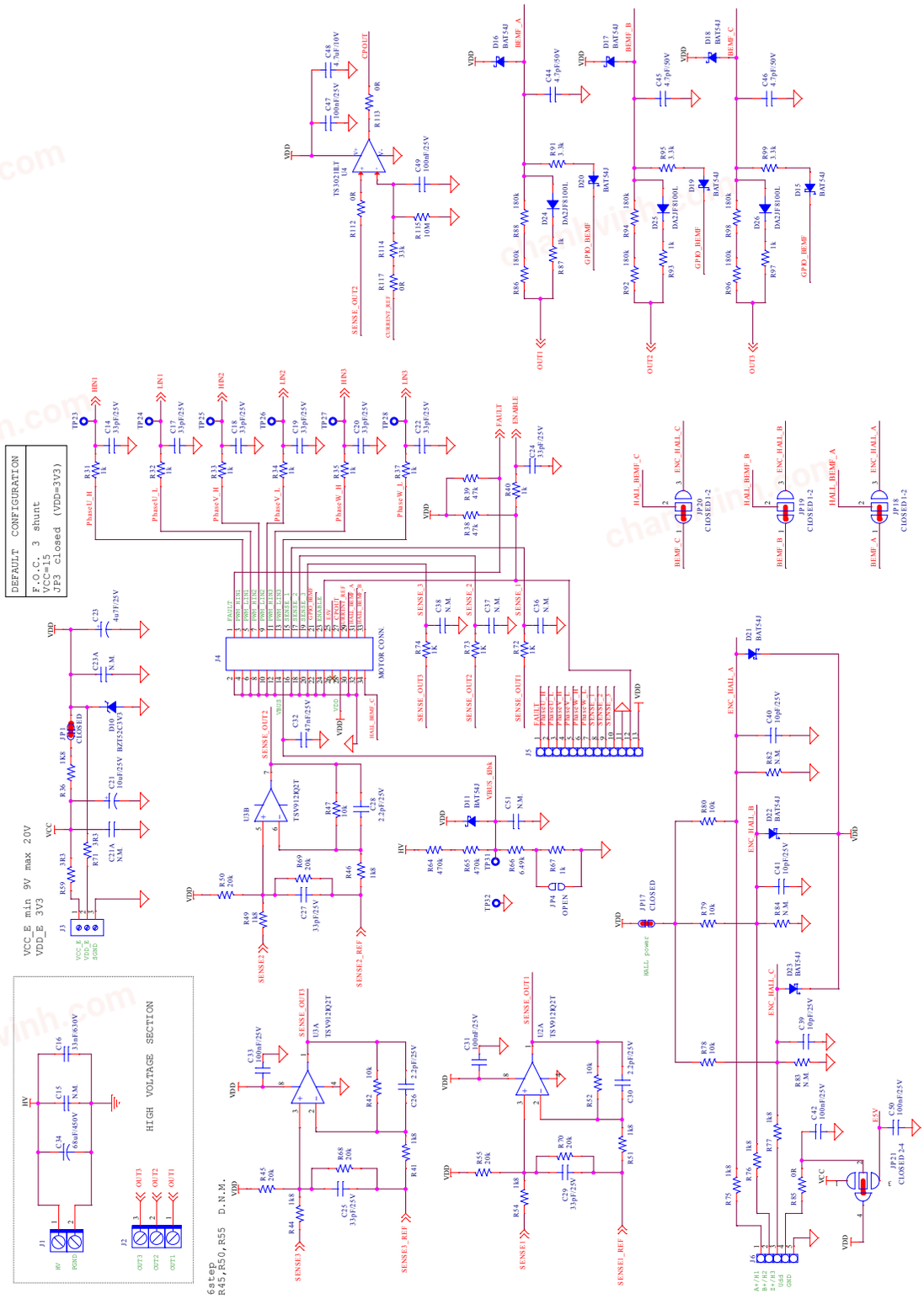
1 Schematic diagram

Figure 1. **EVALSTDRIVE601 schematic – Driver output stages**



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Figure 2. **EVALSTDRIVE601 schematic – feedback network**



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2 Bill of material

Table 1. **Bill of material – components common to all device variants**

Reference	Part Value	Part Description	Package
C1,C4,C7,C9,C12,C13,C36,C37,C38,C51	N.M.	SMT ceramic capacitor	Size 0603
C2,C3	220nF/25V	SMT ceramic capacitor	Size 0603
C5,C6,C8	470nF/50V	SMT ceramic capacitor	Size 0805
C10,C32	47nF/25V	SMT ceramic capacitor	Size 0603
C11	1nF/25V	SMT ceramic capacitor	Size 0603
C14,C17,C18,C19,C20,C22,C24,C25,C27,C29,C35	33pF/25V	SMT ceramic capacitor	Size 0603
C15	N.M.	Film capacitor	4x13 mm, Pitch 10 mm
C16	33nF/630V	SMT multilayer capacitor	Size 1210
C21A	N.M.	SMT ceramic capacitor	Size 1206
C21	10uF/25V	SMD aluminum elect. capacitor	Size C
C23A	N.M.	SMT ceramic capacitor	Size 0805
C23	4u7F/25V	SMD auminum elect. capacitor	Dim. 3.3x3.3 mm
C26,C28,C30	2.2pF/25V	SMT ceramic capacitor	Size 0603
C31,C33,C42,C47,C49,C50	100nF/25V	SMT ceramic capacitor	Size 0603
C34	68uF/450V	THT electrolytic capacitor, radial p7.5 d18h25	Diam. 18 mm, pitch 7.5 mm
C39,C40,C41	10pF/25V	SMT ceramic capacitor	Size 0603
C44,C45,C46	4.7pF/50V	SMT ceramic capacitor	Size 0603
C48	4.7uF/10V	SMT ceramic capacitor	Size 0805
D1,D5,D6,D7,D8,D9,D11,D15,D16,D17,D18,D19,D20,D21,D22,D23	BAT54J	40V, 300mA small signal Schottky SMT Diode	SOD-323
D2,D3,D4	N.M.	Turbo 2 ultrafast high-voltage rectifier	SMA
D10	BZT52C3V3	Zener diode 3.3 V	SOD-123
D24,D25,D26	DA2JF8100L	800V fast recovery diode	SC-90A (SMini2-F5-B)
JP1,JP17	CLOSED	SMT jumper	Soldering pad
JP2,JP3	OPEN	SMT jumper	Size 0805
JP4	OPEN	SMT jumper	Soldering pad
JP18,JP19,JP20	CLOSED 1-2	SMT jumper	Soldering pad
JP21	CLOSED 2-4	SMT jumper	Soldering pads
J1	MORSV-508-2P_screw	Connector terminal block T.H. 2 positions 5.08 mm	Pitch 5.08 mm
J2	MORSV-508-3P_screw	Terminal block T.H. 3 positions, 5.08 mm	Pitch 5.08 mm
J3	MORSV-350-3P_screw	Terminal block T.H. 3 positions, 3.5 mm	Pitch 3.5 mm

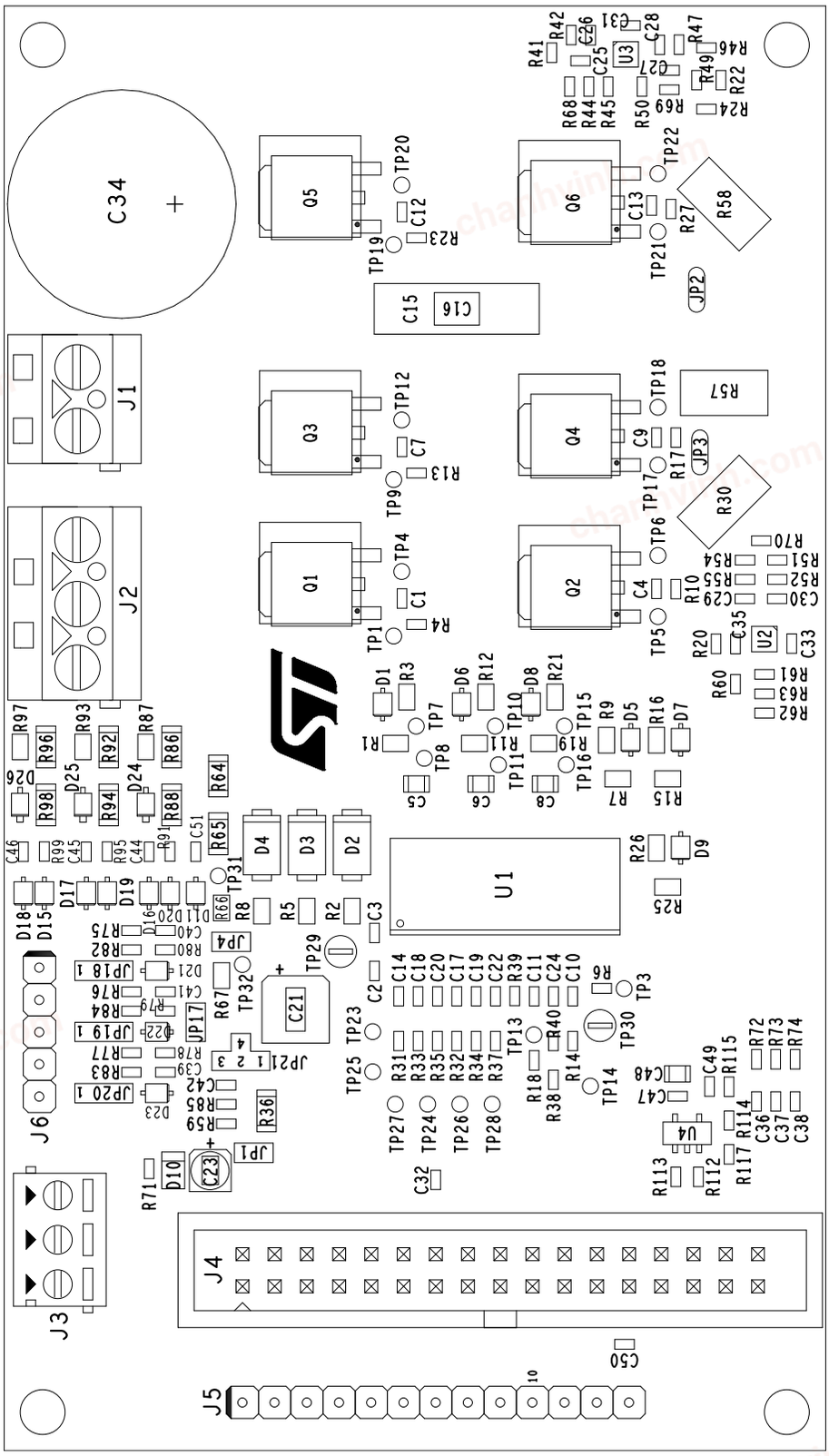
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Reference	Part Value	Part Description	Package
J4	MOTOR CONN.	Header Vertical Connector 2x17 poles, pitch 2.54 mm	2x17 pins
J5	STRIP 1x13	Strip connector 13 pos, 2.54 mm	1x13 pins
J6	STRIP 1x5	Strip connector 5 pos, 2.54 mm	1x5 pins
Q1,Q2,Q3,Q4,Q5,Q6	STGD6M65DF2	Trench gate field-stop IGBT, M series 650V, 6A low loss	DPAK
	Alternative P.N	D.N.M.	equivalent PowerFLAT 8x8
R1,R7,R11,R15,R19,R25	10R	SMT resistor	Size 0805
R2,R5,R8	27R	SMT resistor	Size 0805
R3,R9,R12,R16,R21,R26	100R	SMT resistor	Size 0805
R4,R10,R13,R17,R23,R27	100k	SMT resistor	Size 0603
R6,R62,R85,R112,R113,R117	0R	SMT resistor	Size 0603
R14,R38,R39	47k	SMT resistor	Size 0603
R18,R42,R47,R52,R61,R78,R79,R80	10k	SMT resistor	Size 0603
R20,R22,R24,R31,R32,R33,R34,R35,R37,R40,R72,R73,R74	1K	SMT resistor	Size 0603
R30,R57,R58	220m/ 2W/ 1%	SMT resistor	Size 1210/2512
R36	1K8	SMT resistor	Size 1206
R41,R44,R46,R49,R51,R54,R75,R76,R77	1k8	SMT resistor	Size 0603
R45,R50,R55,R68,R69,R70	20k	SMT resistor	Size 0603
R59,R71	3R3	SMT resistor	Size 0603
R60	4k7	SMT resistor	Size 0603
R63,R82,R83,R84	N.M.	SMT resistor	Size 0603
R64,R65	470k	SMT resistor	Size 1206
R66	6.49k	SMT resistor	Size 0805
R67,R87,R93,R97	1k	SMT resistor	Size 0805
R86,R88,R92,R94,R96,R98	180k	SMT resistor	Size 1206
R91,R95,R99	3.3k	SMT resistor	Size 0603
R114	33k	SMT resistor	Size 0603
R115	10M	SMT resistor	Size 0603
TP1,TP3,TP4,TP5,TP6,TP7,TP8,TP9,TP10,TP11,TP12,TP13,TP14,TP15,TP16,TP17,TP18,TP19,TP20,TP21,TP22,TP23,TP24,TP25,TP26,TP27,TP28,TP31,TP32		TP for probe	Diam. 1.27, Hole 0.8mm
TP29	TP-ANELLO_1mm-ROSSO	Red bead terminal, diam. 1.02mm	Diam. 2,54 , Hole 1mm
TP30	TP-ANELLO_1mm-NERO	Black bead terminal, diam. 1.02mm	Diam. 2,54 , Hole 1mm
U2,U3	TSV912IQ2T	Dual rail-to rail input/output 8 MHz operational amplifiers	DFN8 2x2

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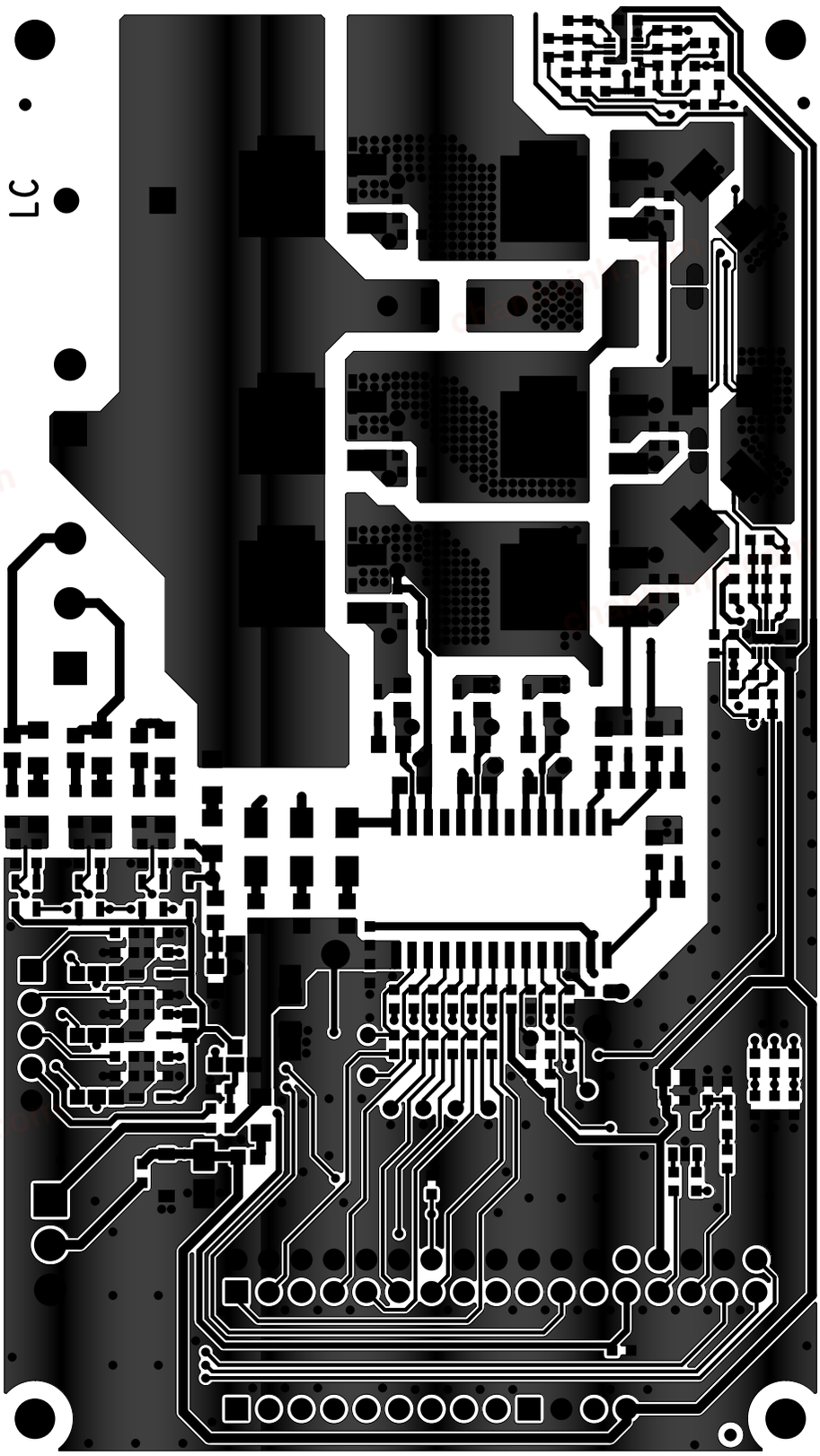
3 Layout and component placements

Figure 3. **EVALSTDRIVE601 – layout (component placement top view)**



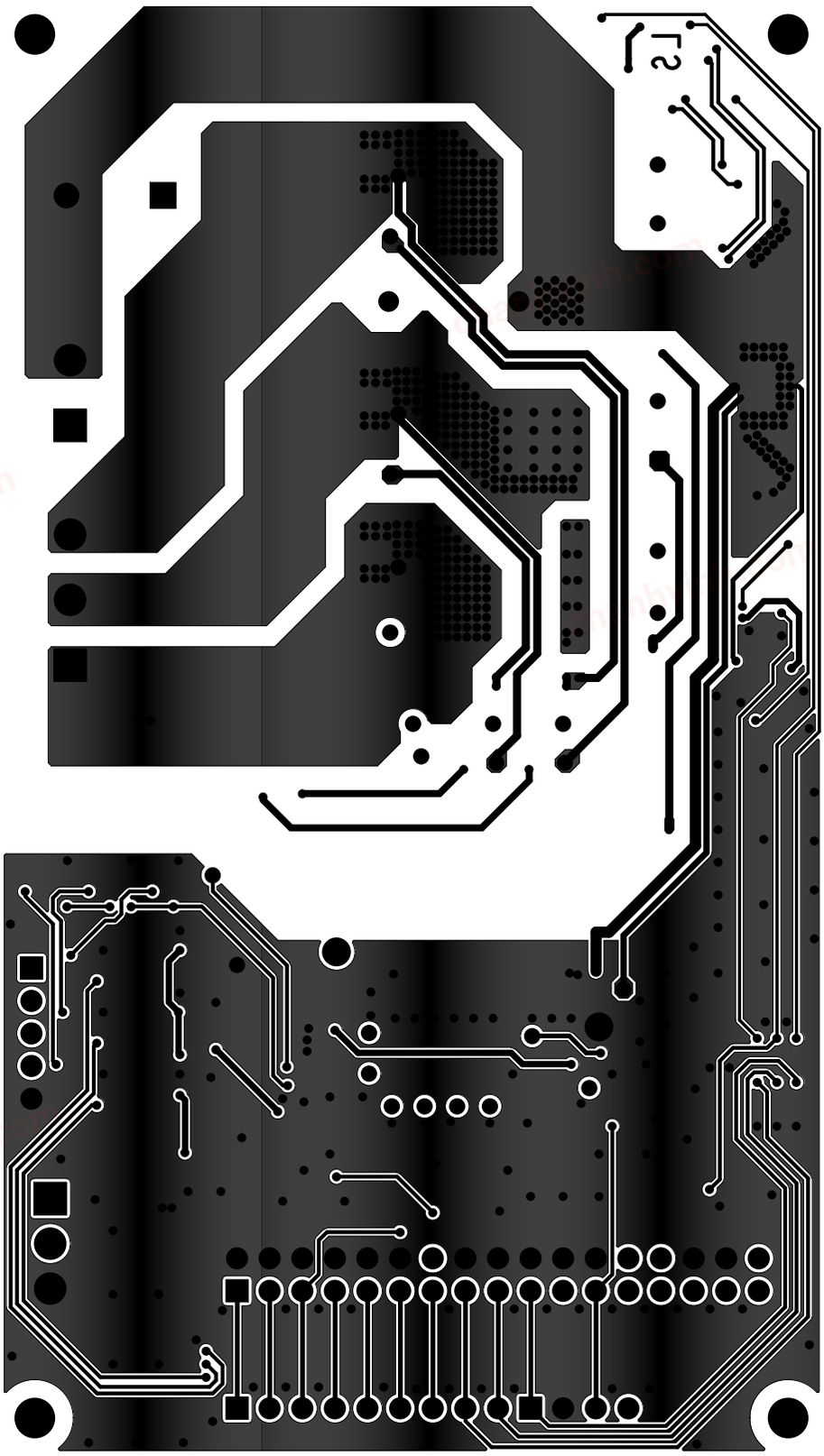
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Figure 4. **EVALSTDRIVE601 – layout (top layer)**



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Figure 5. **EVALSTDRIVE601 – layout (bottom layer)**



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Revision history

Table 2. **Document revision history**

Date	Version	Changes
29-May-2019	1	Initial release.

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