

Module

Randomm

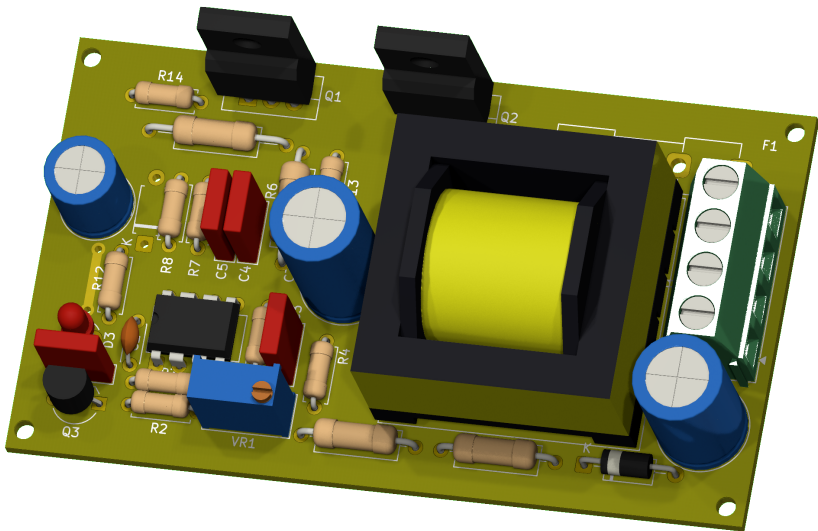
Rev + (Unreleased)

Variant: CHECKED

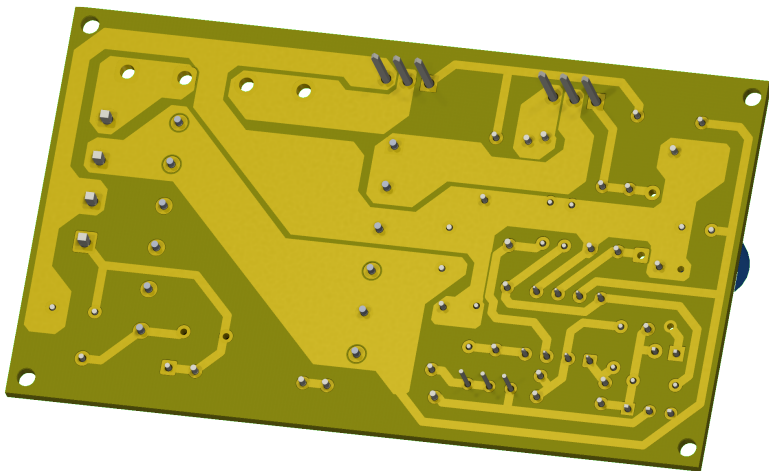
2025-12-19

Page	Index
1	Cover Page
2	Block Diagram
3	Schematic
4	Revision History
5	
6	
7	
8	
9	
10	

TOP VIEW



BOTTOM VIEW



NOTES

Comment

Not fitted components are marked as X

- DRAFT - Early concept stage, schematic drafted.
- PRELIMINARY - Minor schematic changes are expected, ready for layout planning.
- CHECKED - DRC completed, schematic and layout ready for review.
- RELEASED - Design ready for manufacturing.

Date: 19-Dec-2025

DESIGN CONSIDERATIONS

DESIGN NOTE:

Example text for informational design notes.

DESIGN NOTE:

Example text for debug notes.

DESIGN NOTE:

Example text for cautionary design notes.

DESIGN NOTE:

Example text for critical design notes.

LAYOUT NOTE:

Example text for critical layout guidelines.

	Comments:	Company:	Variant:	Git Hash:
		FR	CHECKED	8249b61
		Board Name:	Project Name:	
	Sheet Title:	File Name:	Designer:	Date:
		StepUp_module_12to450V.kicad_sch	FR	2025-01-12
	Sheet Path:	Reviewer:	Size:	Revision:
	/	NA	A3	+ (Unreleased)
				1 of 4

[2] Block Diagram

MODULE INTERFACE:
Vin: 9 V to 2 V according to
AliExpress product page
Vout: 200 V to 450 V,
adjustable through VR1



	Comments: AliExpress module	Company: FR		Variant: CHECKED	Git Hash: 8249b61
		Board Name: Module		Project Name: Step-up module 12:450 V	
	Sheet Title: Block Diagram	File Name: Block Diagram.kicad_sch	Designer: FR	Date: 2025-01-12	Revision: + (Unreleased)
	Sheet Path: /Block Diagram/		Reviewer: NA	Size: A4	Sheet: 2 of 4

[3] Schematic

Comments:

Company: FR

Board Name: Module

Variant: CHECKED

Git Hash: 8249b61

Project Name: Step-up module 12:450 V

Sheet Title: Schematic

File Name: Schematic.kicad_sch

Designer: FR

Date: 2025-01-12

Revision: + (Unreleased)

Sheet Path: /Block Diagram/Schematic/

Reviewer: NA

Size: A4

Sheet: 3 of 4

	Comments:	Company: FR		Variant: CHECKED	Git Hash: 8249b61	
		Board Name: Module		Project Name: Step-up module 12:450 V		
	Sheet Title: Schematic	File Name: Schematic.kicad_sch	Designer: FR	Date: 2025-01-12	Revision: + (Unreleased)	
	Sheet Path: /Block Diagram/Schematic/		Reviewer: NA	Size: A4	Sheet: 3 of 4	

[4] Revision History

Version 1.0.0 - 2023-12-12

- Added
- TVS protection and termination switch to FD-CAN.
 - Low-side switched 12V 600 mA source for external fan.
 - LDO for analog supply.
 - One TVS diode per power connector.
 - Second on-board I2C magnetic encoder for disambiguation.
 - ESD protection to all interfaces.
 - Over-voltage protection on thermistor ADC inputs.
 - Pi filters to inputs of buck regulators and MCU analog supply.
 - Decoupling caps next to power pins of connectors.
- Changed
- CPH-CPL capacitor to 47 nF (gate driver).
 - FD-CAN transceiver IC.
 - FETs for top cooled variant.
 - Input power TVS diode to bidirectional.
 - Moved SOx low-pass filter to MCU section.
 - PWM_PHASEA with PWM_PHASEC on STM32G474 pinout for easier routing.
 - RS422 pinout on connector.
 - Buck regulators to optimize for low noise.

Version 1.0.1 - 2024-01-25

- Added
- Controller target specifications.
 - Credits to moteus on cover page.
 - Optional RC-Snubber to power stage.
- Fixed
- Chassis guard ring to go around the board.
 - CAN and power TVS diodes now go to chassis.
 - Clearance between nets to respect IEC60664-1 where possible.
 - Comment on precharge.
 - Power TVS diode reference designator from "U" to "D".
- Changed
- 5V 300 mA buck converter with 600 mA version.
 - Chassis-GND capacitor by 1nF 1kV.

Version 1.0.2 - 2024-03-12

- Changed
- Power sequencing graph according to experimental data.

Version 1.1.0 - 2024-04-13

- Added
- RC snubber passive values.
- Fixed
- More vias for VBUS and LMR36006 GND pads.
 - Board version voltage reference from +3V3 to +A3V3.
- Changed
- Motor thermistor resistor divider to 2kOhm for a 10k 3950K thermistor.

	Comments:	Company:		Variant:	Git Hash:
	"Comment 1"	FR		CHECKED	8249b61
	"Comment 2"	Board Name: Module		Project Name: Step-up module 12:450 V	
	"Comment 3"				
	Sheet Title:	File Name:	Designer:	Date:	Revision:
	Revision History	Revision History.kicad_sch	FR	2025-01-12	+ (Unreleased)
	Sheet Path:		Reviewer:	Size:	Sheet:
	/Revision History/		NA	A4	4 of 4