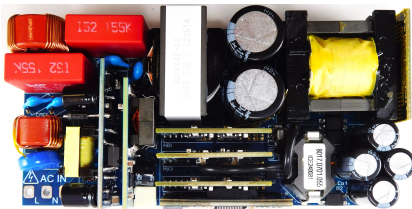


High efficiency 24 V – 250 W power adapter based on GaN and digital control



The picture shown is for illustration purpose only.
Actual product may vary depending on buyer's selection and availability.

Features

- Topology: ZVS Totem Pole PFC + HB LLC with SR
- GaN based power stage
- Digital control based on a single STM32G474 MCU
- Output rated power: 250 W
- Input voltage range: $V_{in} = 115 - 230 \text{ Vac}$
- Peak efficiency: 96 % at full load, 230 Vac
- Power density: $>1 \text{ W/cm}^3$ (17 W/in^3)
- No load consumption: $< 150 \text{ mW}$

Description

STEVAL-250GANCB is an AC/DC power adapter consisting of three stages: a totem pole PFC (AC/DC) working in zero voltage switching, variable frequency mode; a resonant half bridge LLC converter (DC-DC), and a synchronous rectification output stage.

High-power density is achieved thanks to the GaN switches [SGT120R65AL](#), combined with [STGAP2GS](#) GaN driver.

The [SGT120R65AL](#) will be soon replaced by the new [SGT100R70FDC](#).

The solution uses a single microcontroller [STM32G474RE](#) to control the PFC and primary side of LLC. The synchronous rectification stage is controlled by the [SRK2001](#) and two parallel [STL120N10F8](#) STripFET F8 power MOSFETs.

The totem pole PFC operates in ZVS with variable switching in the range of $35 \div 300 \text{ kHz}$, from light load to full load.

The LLC implements frequency modulation to regulate the output voltage and operates at variable frequency from 200 to 300 kHz, with a resonance frequency of 227 kHz. The startup phase is performed at high frequency from 500 down to 200 kHz.

Thanks to the excellent switching performance of GaN devices at high frequency and the soft switching techniques (ZCS and ZVS) in all stages, a peak efficiency of 96% was achieved.

Product summary	
High efficiency 24 V – 250 W power adapter based on GaN and digital control	STEVAL-250GANCB
650 V (700 V) , 75 mOhm typ., e-mode PowerGaN transistor	SGT120R65AL/ (SGT100R70FDC)
N-channel 100 V, 4.6 mOhm max., 125 A STripFET F8 Power MOSFET in a PowerFLAT 5x6 package	STL120N10F8
Mainstream Arm Cortex-M4 MCU 170 MHz	STM32G474RET6
Isolated 3 A single gate driver for Enhancement mode GaN FETs	STGAP2GSNC
38 V, 5W synchronous iso-buck converter	L69861TR
Adaptive synchronous rectification controller	SRK2001
VIPerPlus family: Zero-power off-line high voltage converter	VIPER0PLD
Application	Battery charger

Schematic diagrams

Notice: These schematics are for illustration purpose only. Actual product may vary depending on buyer's selection and availability.

Figure 1. Main board circuit schematic

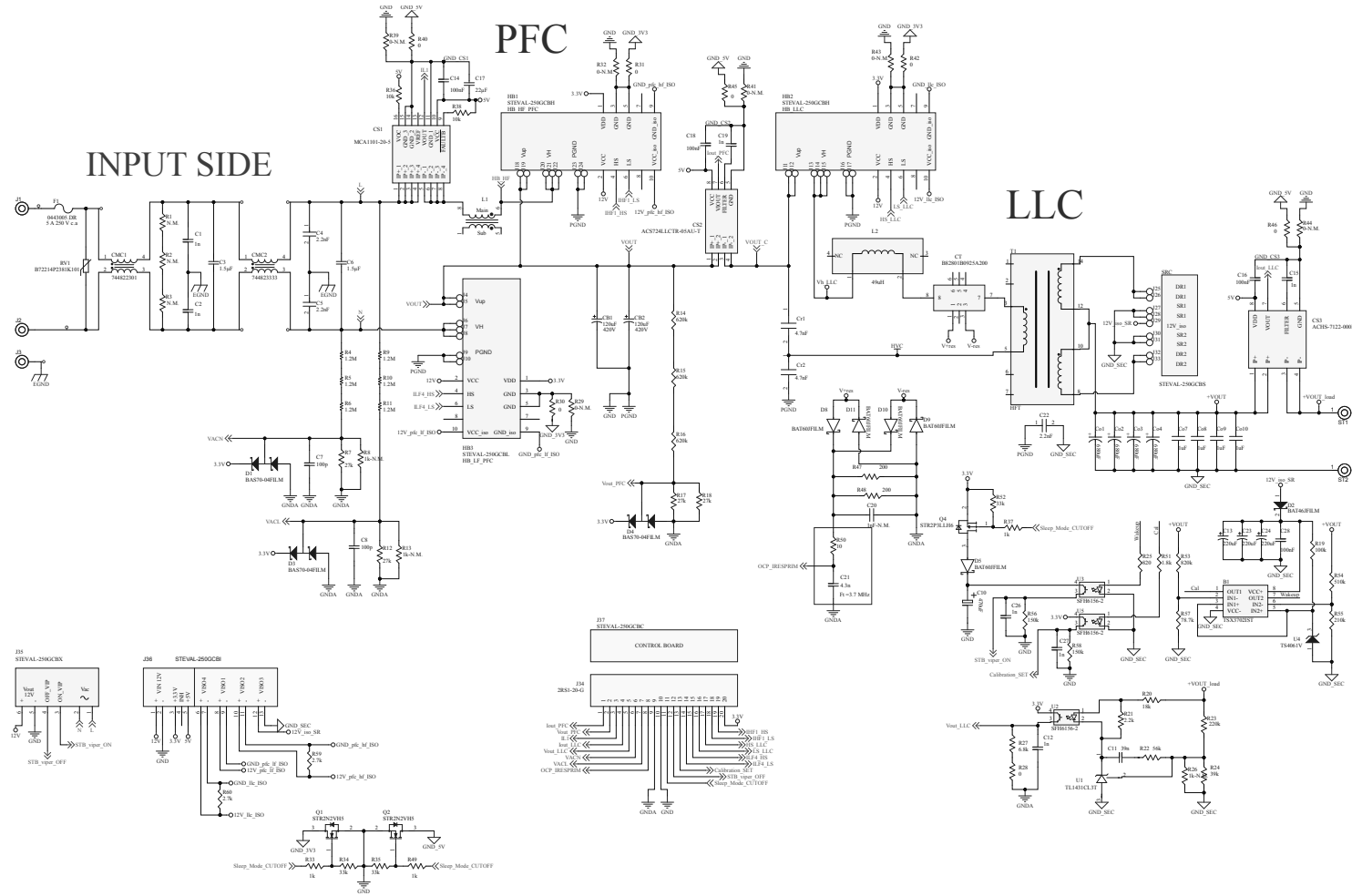


Figure 2. Main board circuit schematic

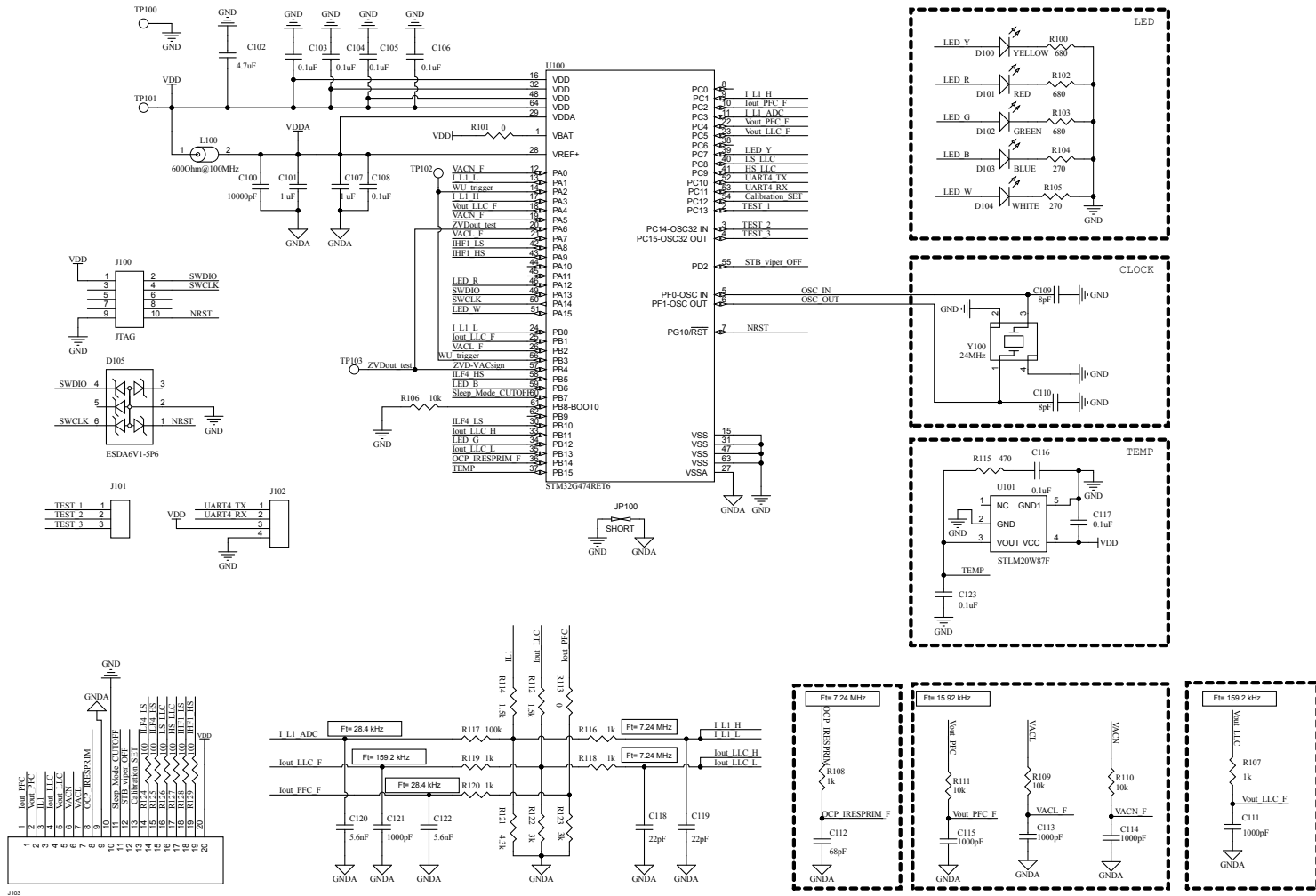


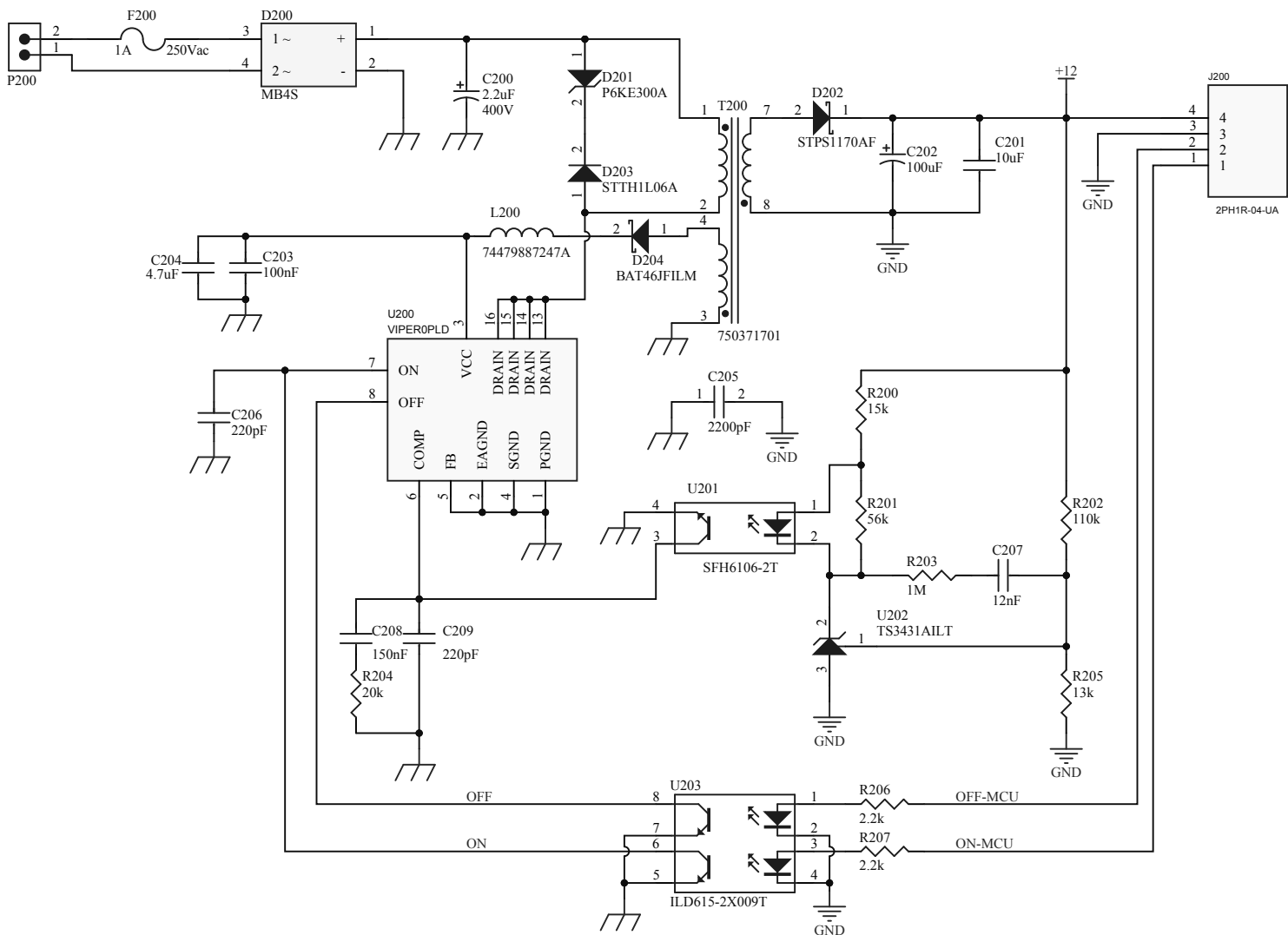
Figure 3. 12 V auxiliary power supply board circuit schematic


Figure 4. 12 V Isolated auxiliary power supply board circuit schematic

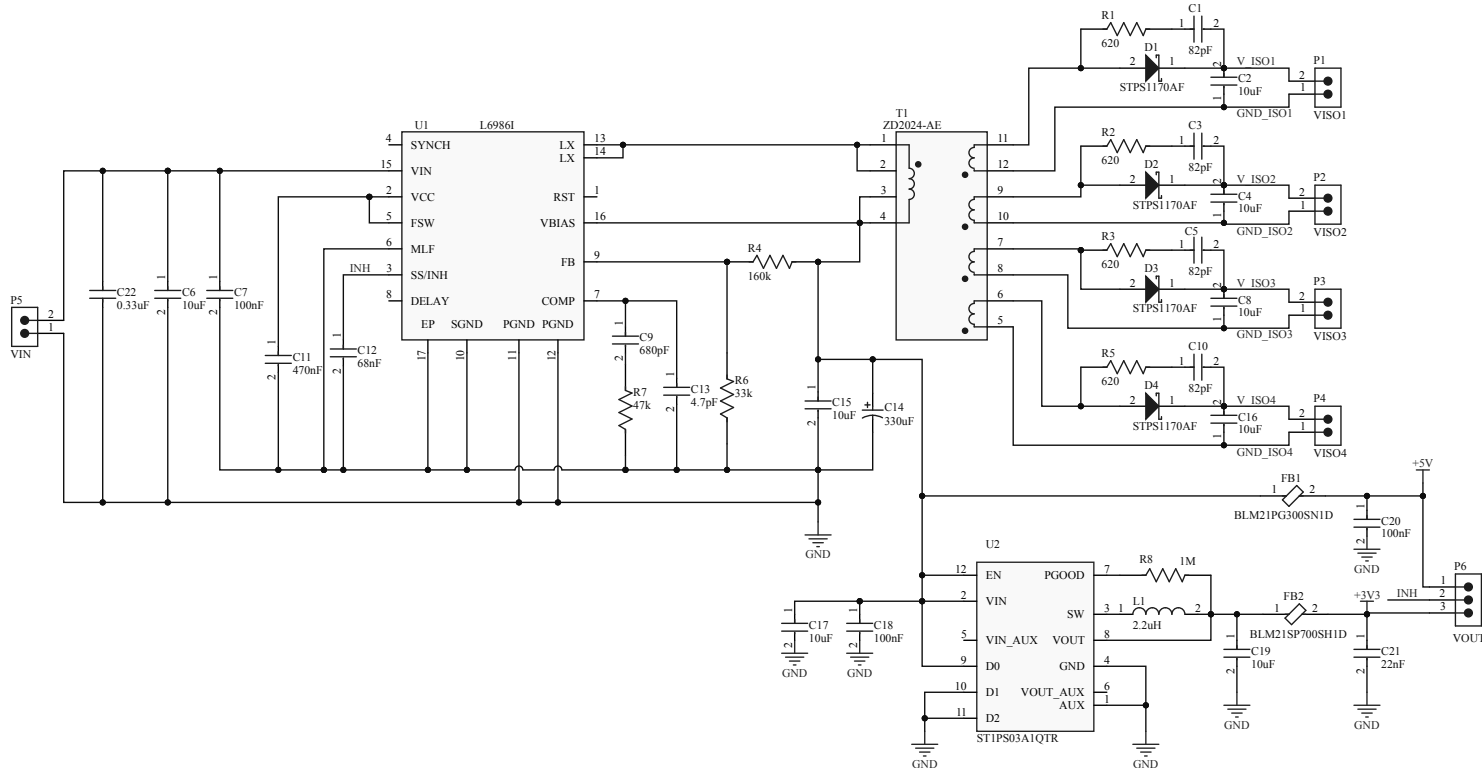


Figure 5. Low frequency half bridge board circuit schematic

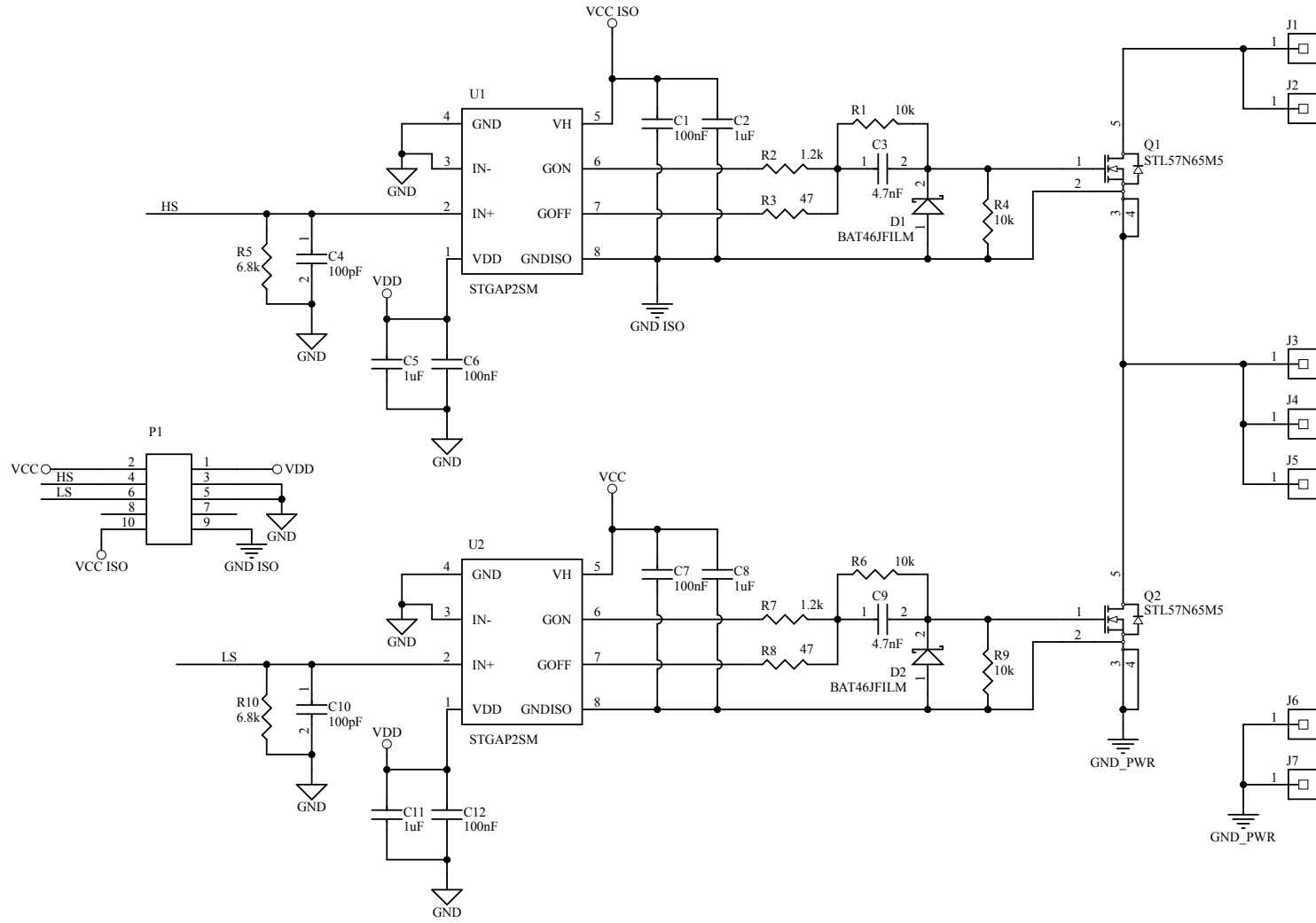


Figure 6. High frequency half bridge board circuit schematic

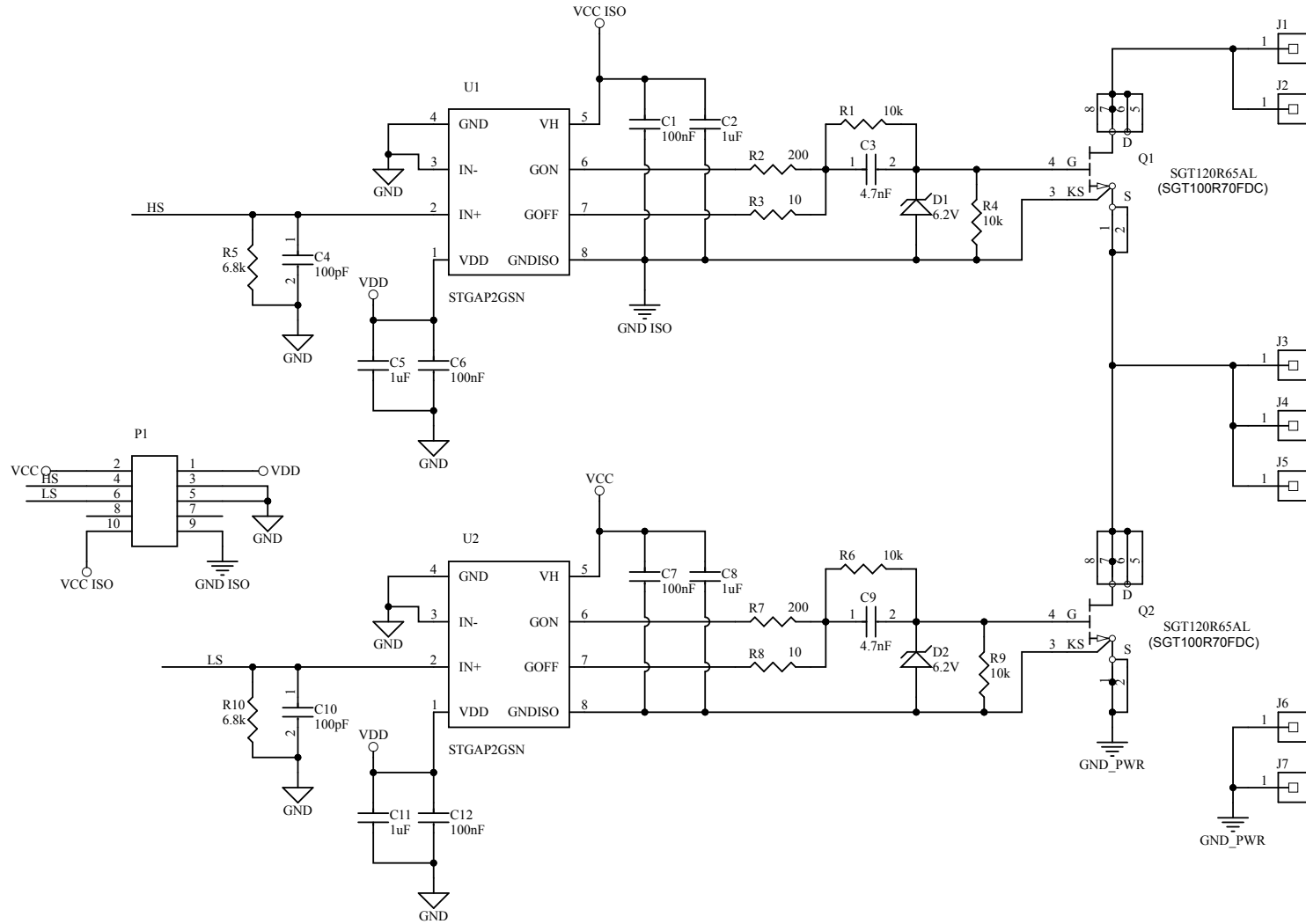
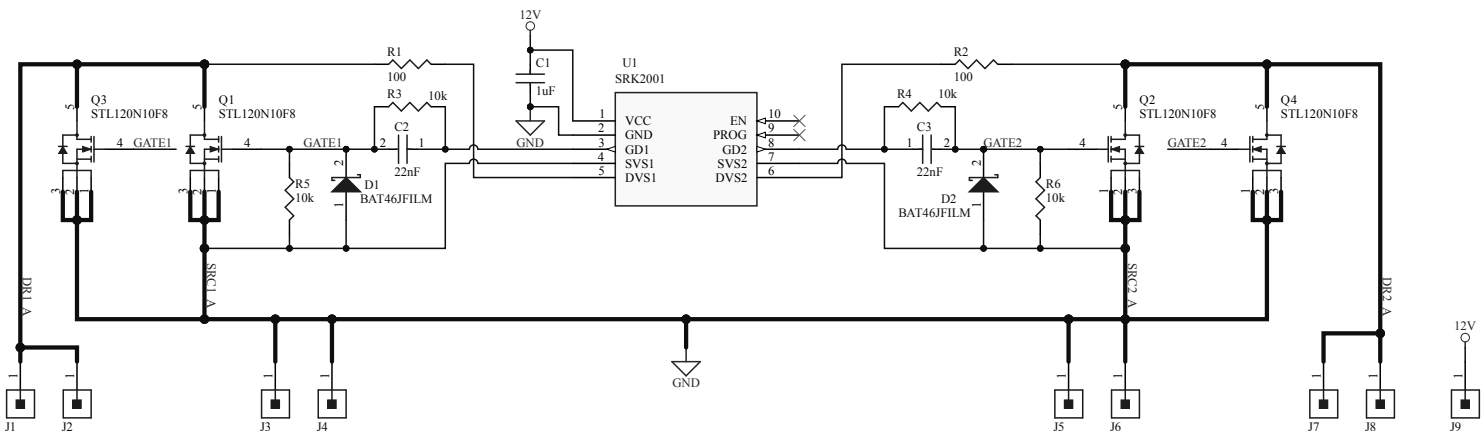


Figure 7. Synchronous rectification board circuit schematic





2 Custom evaluation boards information

Notice: *These evaluation boards are custom designed and built, in small quantities, according to specific requests from customers and are destined for evaluation and testing of ST products in a research and development setting. Please contact ST to provide your specific requests and get your custom built board(s).*

Revision history

Table 1. Document revision history

Date	Revision	Changes
03-Apr-2024	1	Initial release.
25-Jun-2025	2	Updated Product summary, Description and Schematics. Added references to SGT100R70FDC.

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