STEVAL-ISA172V3

Data brief

2 kW fully digital AC-DC power supply (D-SMPS) evaluation board

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

Product summary	
2 kW fully digital AC-DC power supply (D-SMPS) evaluation board	STEVAL-ISA172V3
STM32G474 interleaved boost PFC and full bridge PSU firmwares package for STEVAL-ISA172V3	STSW-ISA172V3
Mainstream Arm Cortex-M4 MCU 170 MHz with 512 Kbytes of Flash memory, Math Accelerator, HR Timer, High Analog level integration	STM32G474RET6
Applications	Digital power

Features

- Input AC voltage: 90 to 264 V
- Output DC voltage: 48 or 55 V, max output current: 42 A
- Input AC frequency: 47 to 63 Hz
- Nominal output power: 2 kW
- Interleaved boost PFC stage
- PFC switching frequency: 70 kHz
- PFC average in current mode control
- Cycle by cycle PFC current control
- Maximum power factor: 0.99
- DC-DC stage: full-bridge phase-shifted ZVS with synchronous rectification
- DC-DC switching frequency: 100 kHz
- Overall efficiency: 80 plus gold standard
- HF transformer isolation voltage: 4 kV
- Forced cooling with air flow speed modulation according to the output power
- Overtemperature protection
- Output short-circuit protection
- PFC control and DC-DC control: managed by STM32G474RE
- PFC power stage based on MDmesh M6 power MOSFETs and SiC diodes
- DC-DC power stage based on MDmesh DM6 power MOSFETs
- Synchronous rectification based on STripFET F7 power MOSFETs
- EMC filter for noise reduction
- RoHS compliant

Description

The STEVAL-ISA172V3 is a 2 kW fully digital switch mode AC-DC converter consisting of two power sections: a two-phase interleaved power factor corrector (PFC) and a DC-DC phase-shifted full-bridge converter, controlled by a STM32G474RE microcontroller for each section.

The interleaved PFC comprises two boost converters operating with 180° out of phase, based on 600 V MDmesh M6 power MOSFETs.

The downstream section comprises a DC-DC phase-shifted full-bridge converter based on MDmesh DM6 power MOSFETs and performing voltage step down using HF transformer, with a primary to secondary ratio chosen to maintain high enough efficiency and regulation over the entire operating range.

On the primary side, the transformer is supplied by the full-bridge converter and switching losses are reduced thanks to zero voltage switching (ZVS) operation.

On the secondary side synchronous rectification (SR) is used to ensure low conduction losses.

The output voltage waveform is rectified by STripFET power MOSFETs and then smoothed by the output filter.

1 Additional information

The combination of the design choices results in boosted efficiency, in line with standard requirements in the power supply industry.

The system is controlled by two STM32G474RE microcontrollers, one for each section.

This microcontroller adds innovative features such as a high-resolution timer, which gives increased accuracy in terms of current regulation on the primary PFC and on the secondary DC-DC phase-shifted full-bridge side.

The two microcontrollers exchange information about the status of the input and output power stage via bidirectional serial communication.

Both the power stage and control stage are supplied by an offline flyback circuit based on the VIPER31.

The VIPER31 provides a suitable regulated voltage to the microcontrollers, as well as the gate driver ICs and the signal conditioning circuits.

2 Schematic diagrams

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

Figure 1. STEVAL-ISA172V3 circuit schematic (Auxiliary power supplies)

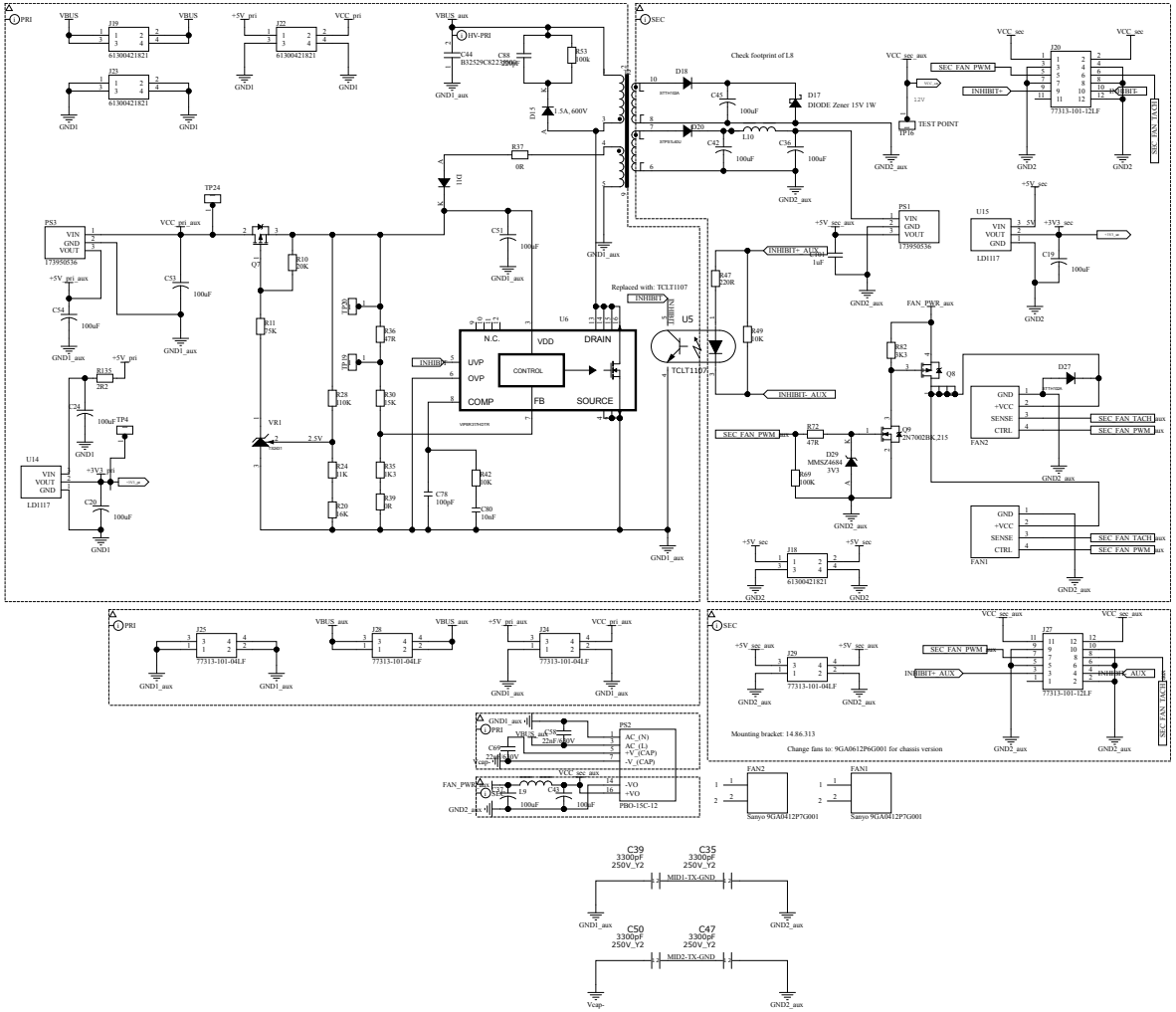


Figure 2. STEVAL-ISA172V3 circuit schematic (Gate drivers)

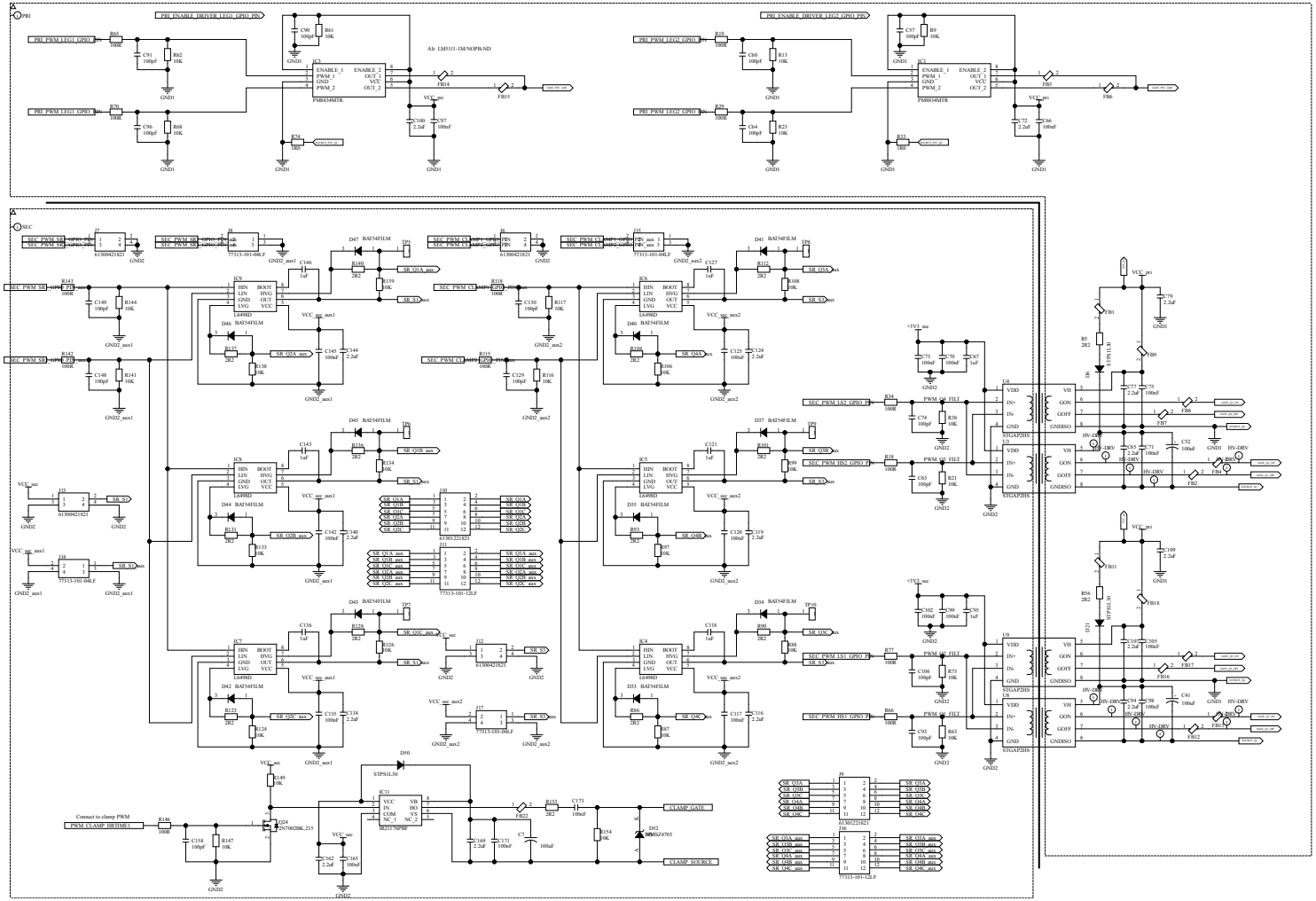


Figure 3. STEVAL-ISA172V3 circuit schematic (Input EMI)

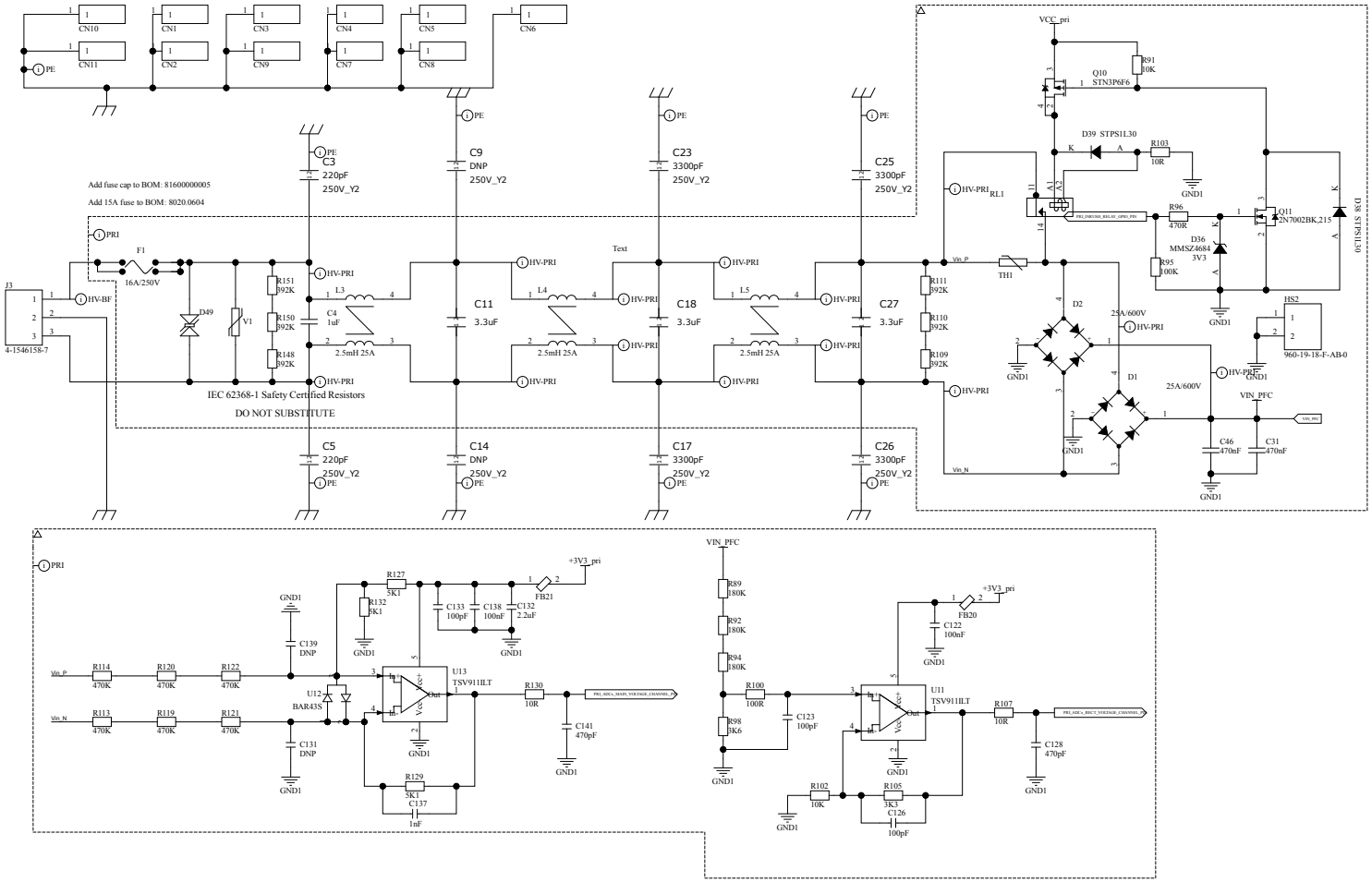


Figure 4. **STEVAL-ISA172V3 circuit schematic (Interleaved PFC)**

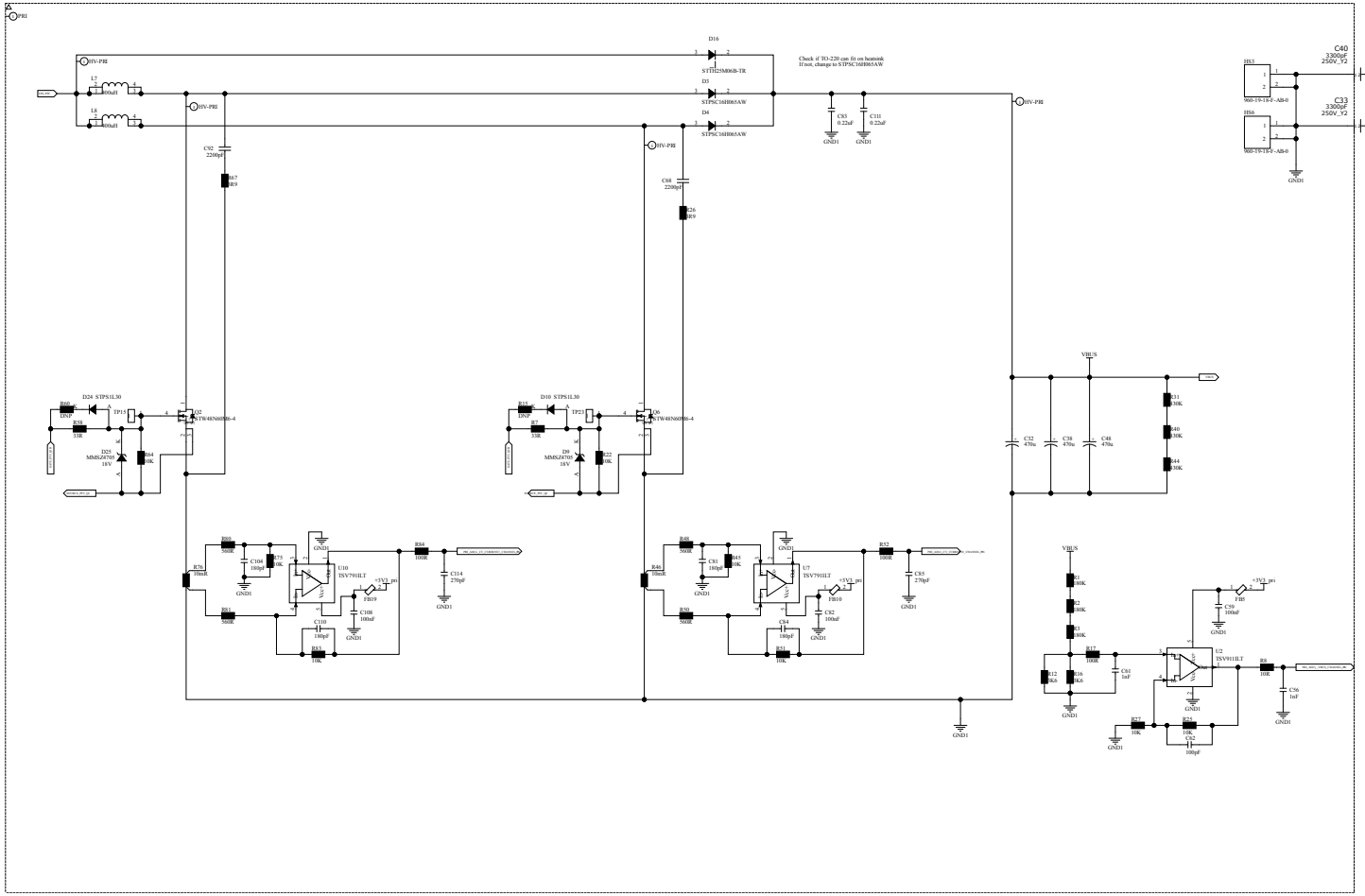


Figure 5. STEVAL-ISA172V3 circuit schematic (MCU connectors)

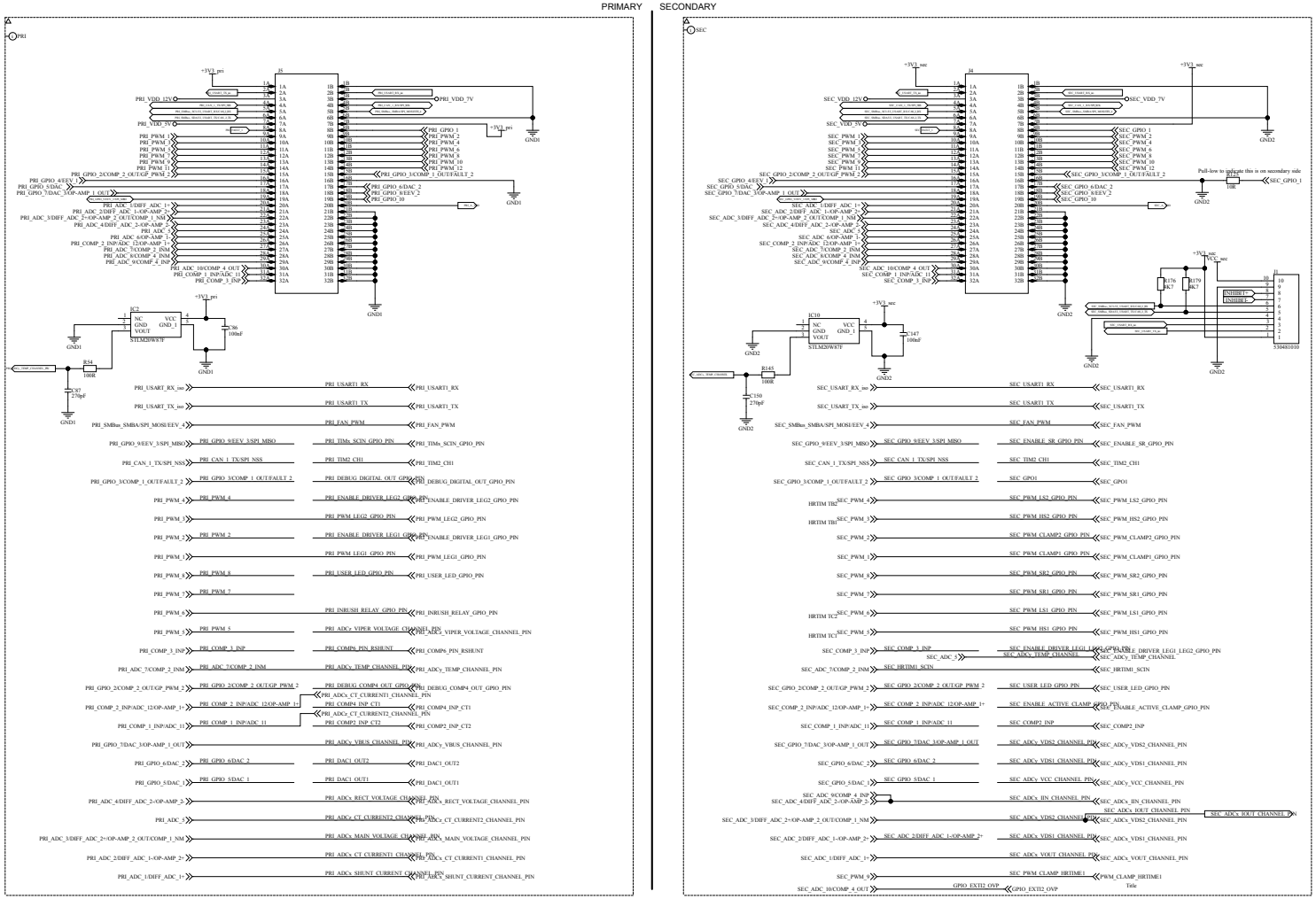


Figure 6. STEVAL-ISA172V3 circuit schematic (Optocouplers)

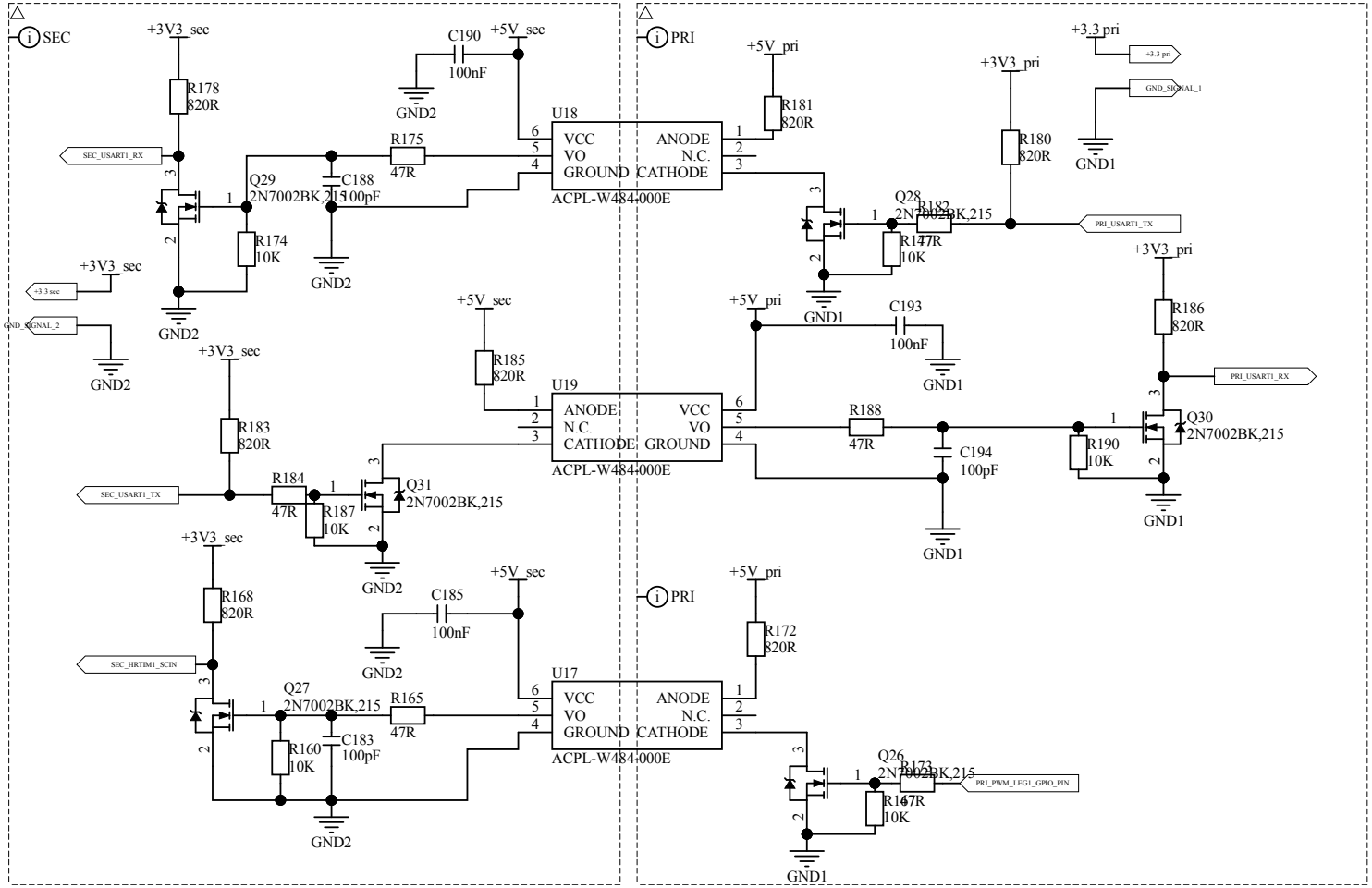


Figure 7. **STEVAL-ISA172V3 circuit schematic (Phase-shift full-bridge DC/DC)**

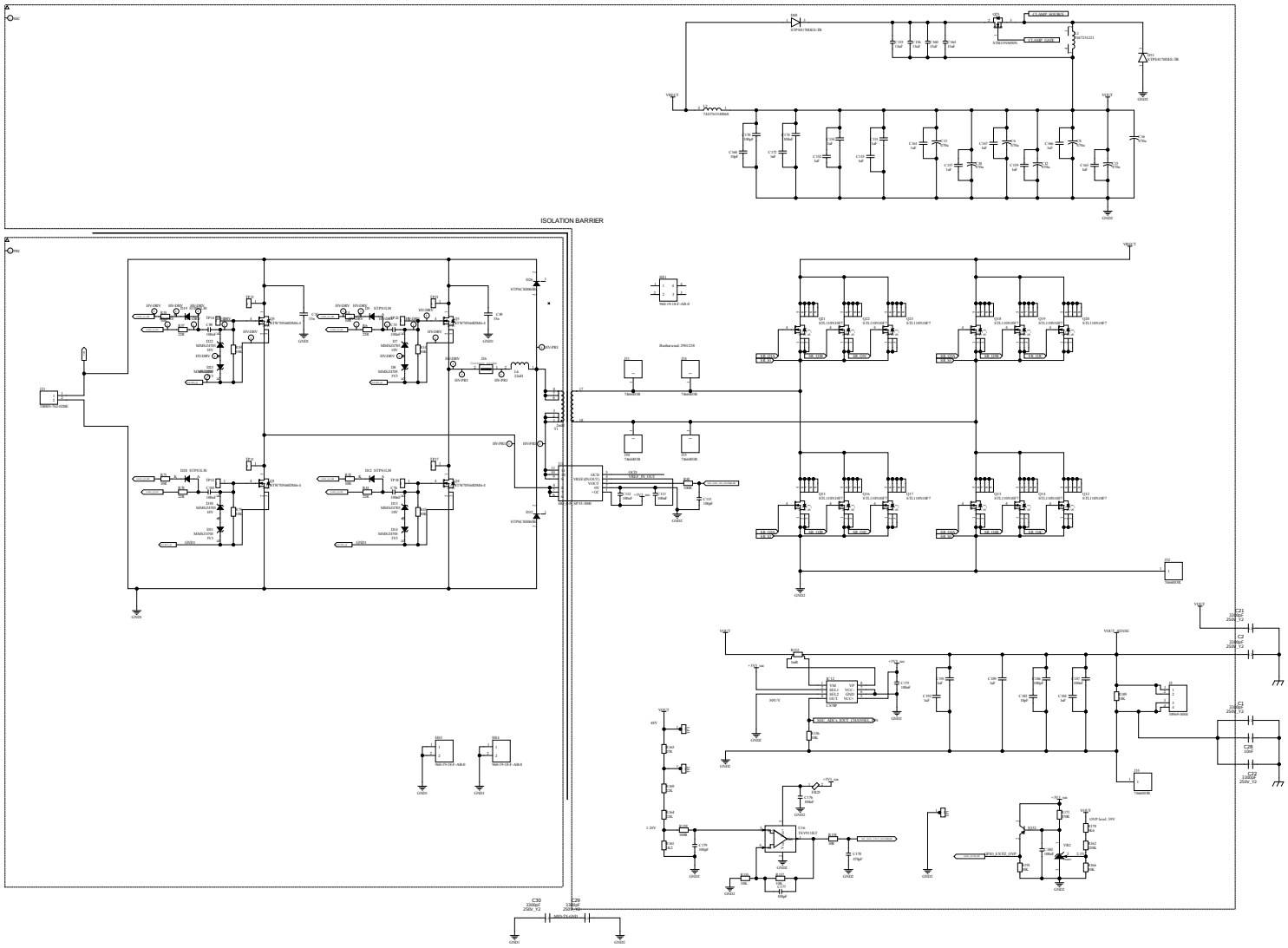


Figure 8. STEVAL-DPSG474 control board: MCU circuit schematic

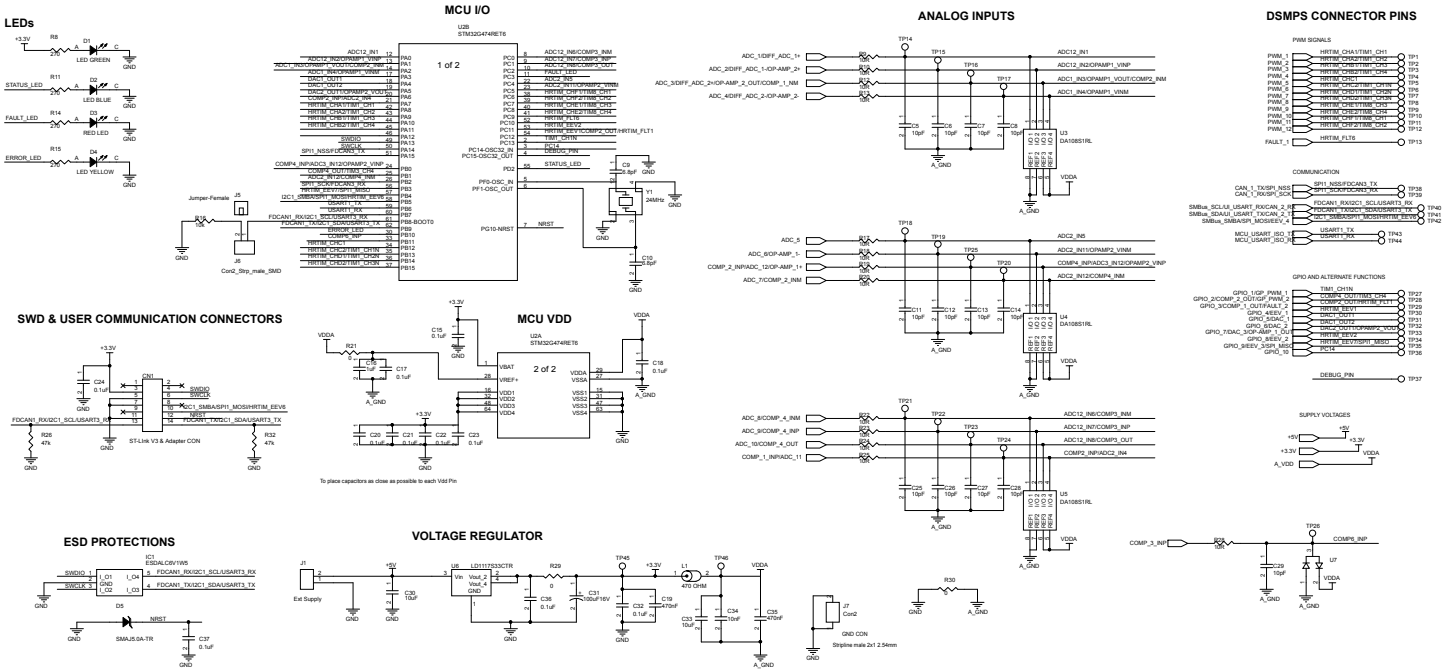


Figure 9. STEVAL-DPSG474 control board: D-SMPS connector circuit schematic

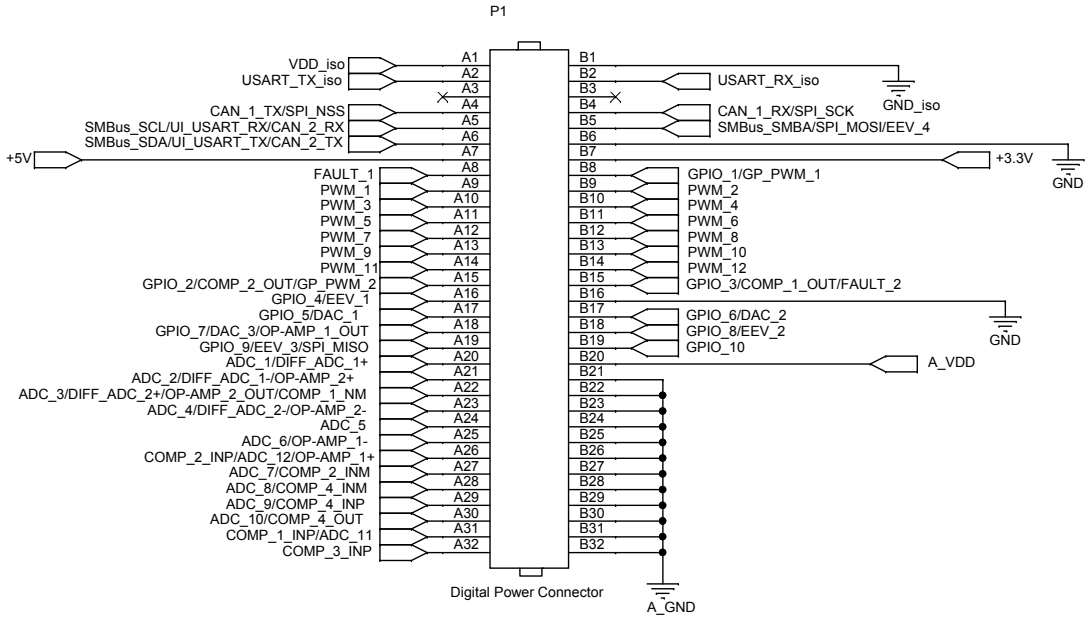


Figure 10. STEVAL-DPSG474 control board: isolated communication circuit schematic

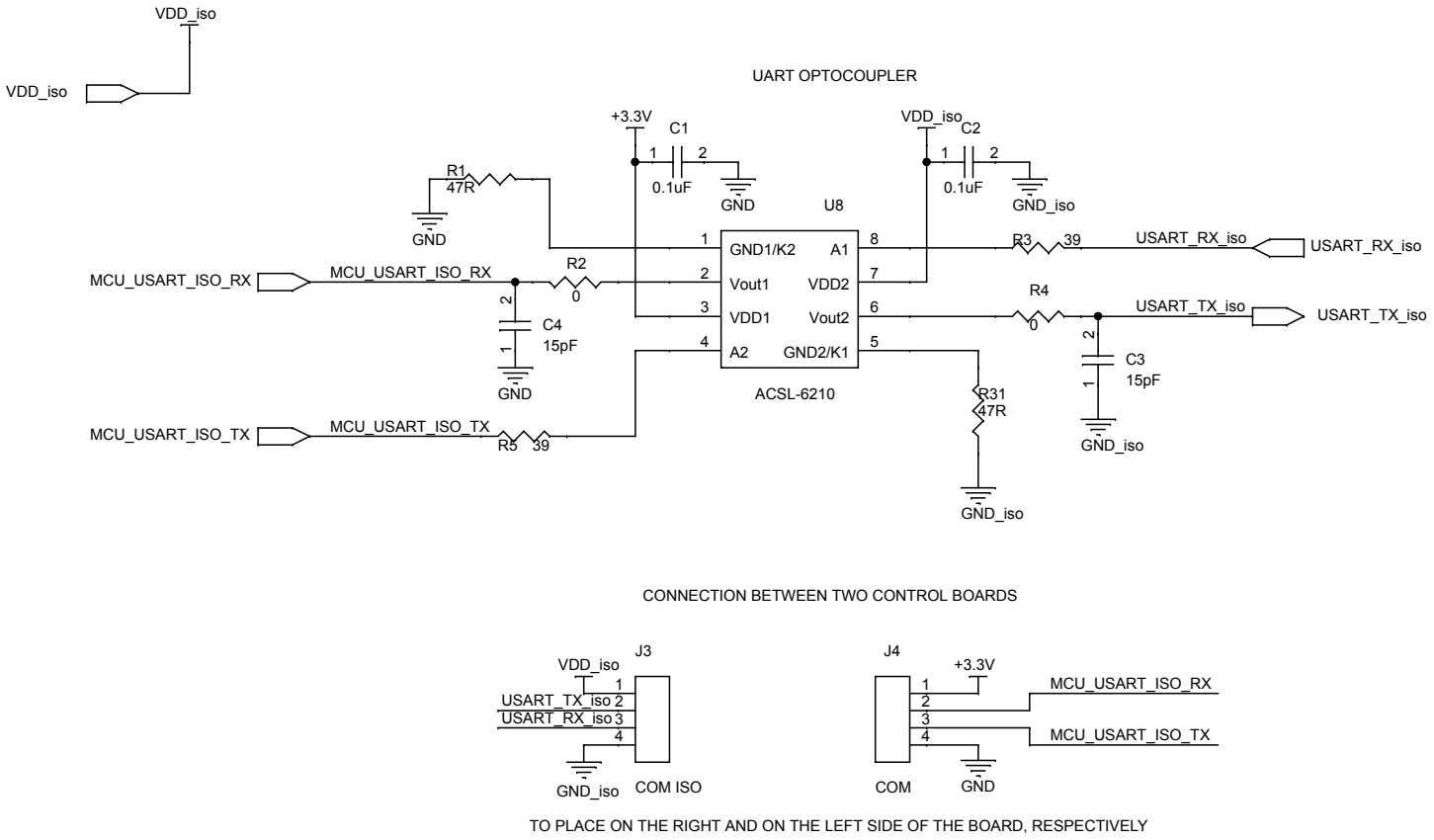
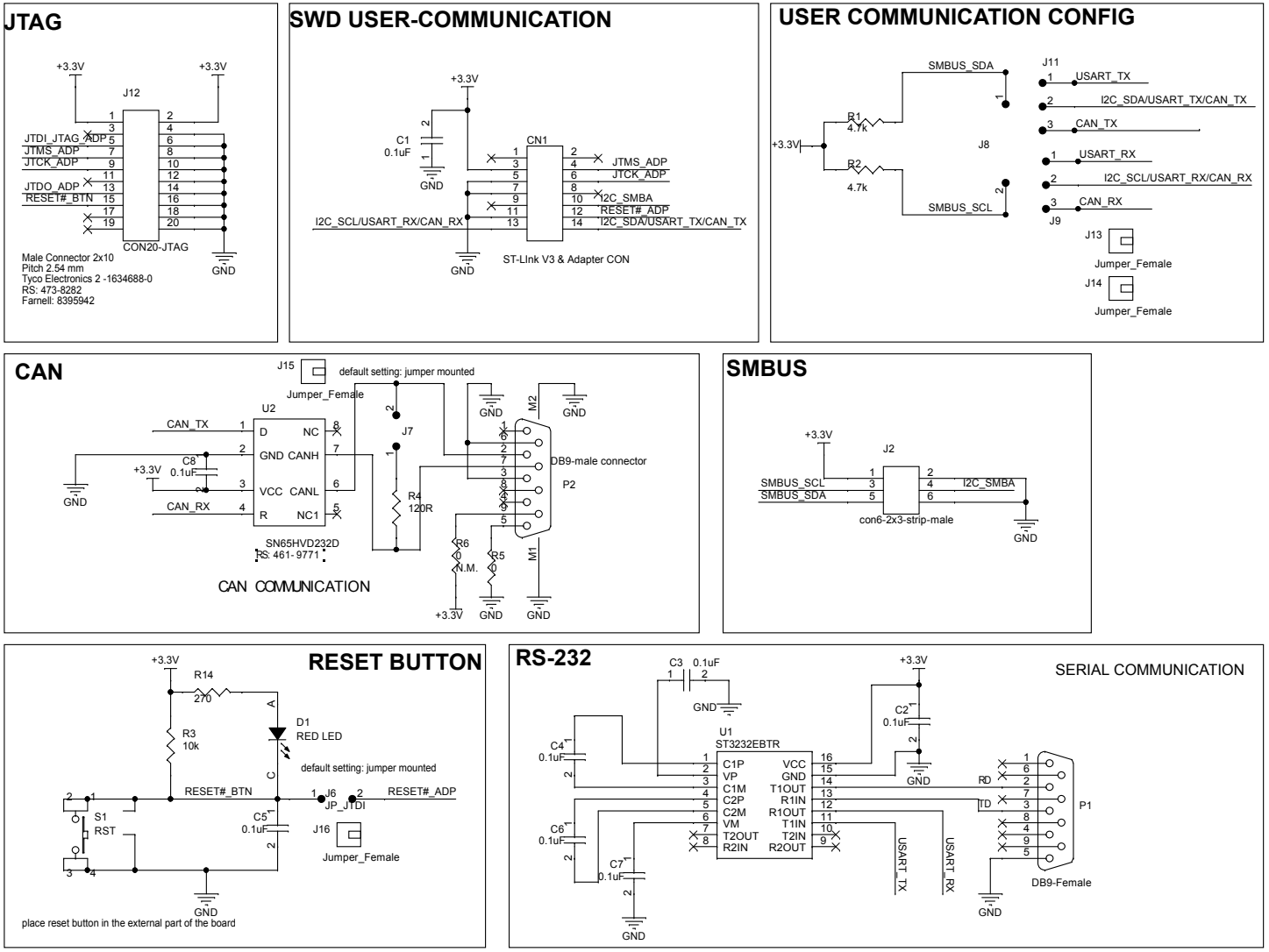


Figure 11. **STEVAL-DPSG474 adapter board circuit schematic**



3 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
15-Jun-2026	1	Initial release.

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