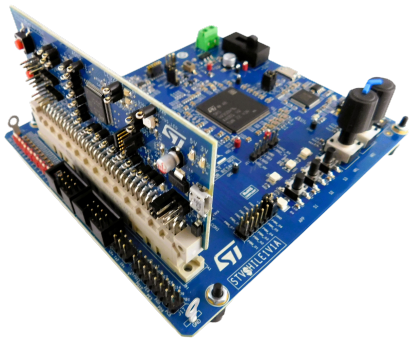
STEVAL-HILE1G4K1

Data brief

HIL - Hardware in the Loop - cost effective emulation tool for digital power converters, based on STM32G474 and STELLAR E1 MCUs



Features

- Model-based power plant emulation
- High simulation accuracy for AFE and VSI (maximum simulation frequency: 100 kHz)
- Extensive onboard I/Os: 12x PWM inputs, 20x DAC outputs
- Fault injection support
  - AC and DC overvoltage
  - AC and DC overcurrent
- User interface: pushbuttons, LEDs, potentiometers
  - Grid and relay status monitoring
  - Grid and load activation and setting
- GUI for real time monitoring and efficient debugging

Product summary	
HIL - Hardware in the Loop - cost effective emulation tool for digital power converters, based on STM32G474 and STELLAR E1 MCUs	STEVAL-HILE1G4K1
Mainstream Arm Cortex-M4 MCU 170 MHz with 512 Kbytes of Flash memory	STM32G474RET3
SR5 E1 line of Stellar electrification MCUs, 32-bit Arm Cortex-M7 automotive MCU 2x cores	SR5E1E770C30F01X
Applications	Digital power / Battery storage systems for home / Battery storage systems for commercial / EV charging / DC fast charging stations

Description

The STEVAL-HILE1G4K1 evaluation kit includes an emulator board based on the Stellar E1 MCU and a control board featuring the STM32G474RE MCU.

Designed for safe, low-voltage emulation of digital power converters, it enables verification of control algorithms by simulating a virtual power circuit where the real controller interacts under both normal and fault conditions, eliminating the risk to physical power hardware.

The HIL board emulates the complete power conversion system, including AC and DC sources, converter power stages, and loads.

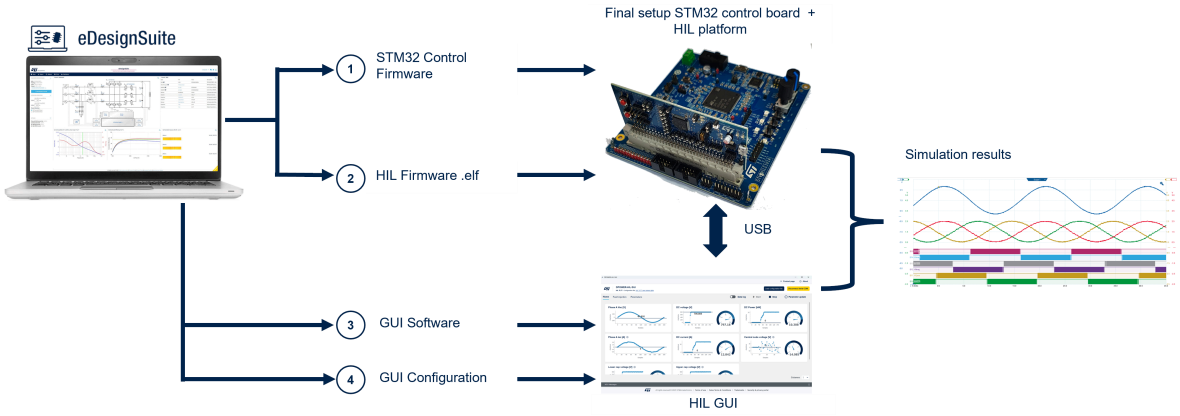
It supports multiple converter types such as three-phase PFC and isolated DC-DC converters, covering topologies like the Vienna rectifier, 3-Level T-type, 3-Phase 2-Level (B6), and dual active bridge (DAB) converters.

A dedicated software GUI offers intuitive real-time visualization and analysis of critical parameters and signals, enabling users to monitor system performance, detect anomalies, and fine-tune control algorithms efficiently. The interface supports customizable dashboards, signal logging, and interactive controls to facilitate comprehensive debugging and validation throughout the development process.

This kit significantly reduces development time and costs by enabling early-stage testing and debugging of power converter control strategies in a risk-free environment.

1 HIL platform integration in eDesignSuite and workflow overview

Figure 1. HIL platform workflow overview



The HIL platform is a key component of the eDesignSuite convergence, enabling seamless integration of digital power development and real-time simulation.

The flow begins with generating the STM32 control firmware and the HIL firmware from the eDesignSuite environment for the selected power converter topology, incorporating the hardware and firmware customizations made by the user during the design process.

These are deployed to the STM32 control board and the HIL board, respectively.

Parallel to firmware deployment, the GUI software, and GUI configuration files are downloadable from eDesignSuite.

This graphical interface provides real-time visualization, control, and configuration of the HIL simulation environment, and testing of the power converter.

This integrated setup streamlines hardware verification, firmware predevelopment, and customer system validation.

2 Schematic diagrams

Figure 2. **STEVAL-HILE1V1 - HIL board circuit schematic (1 of 6)**

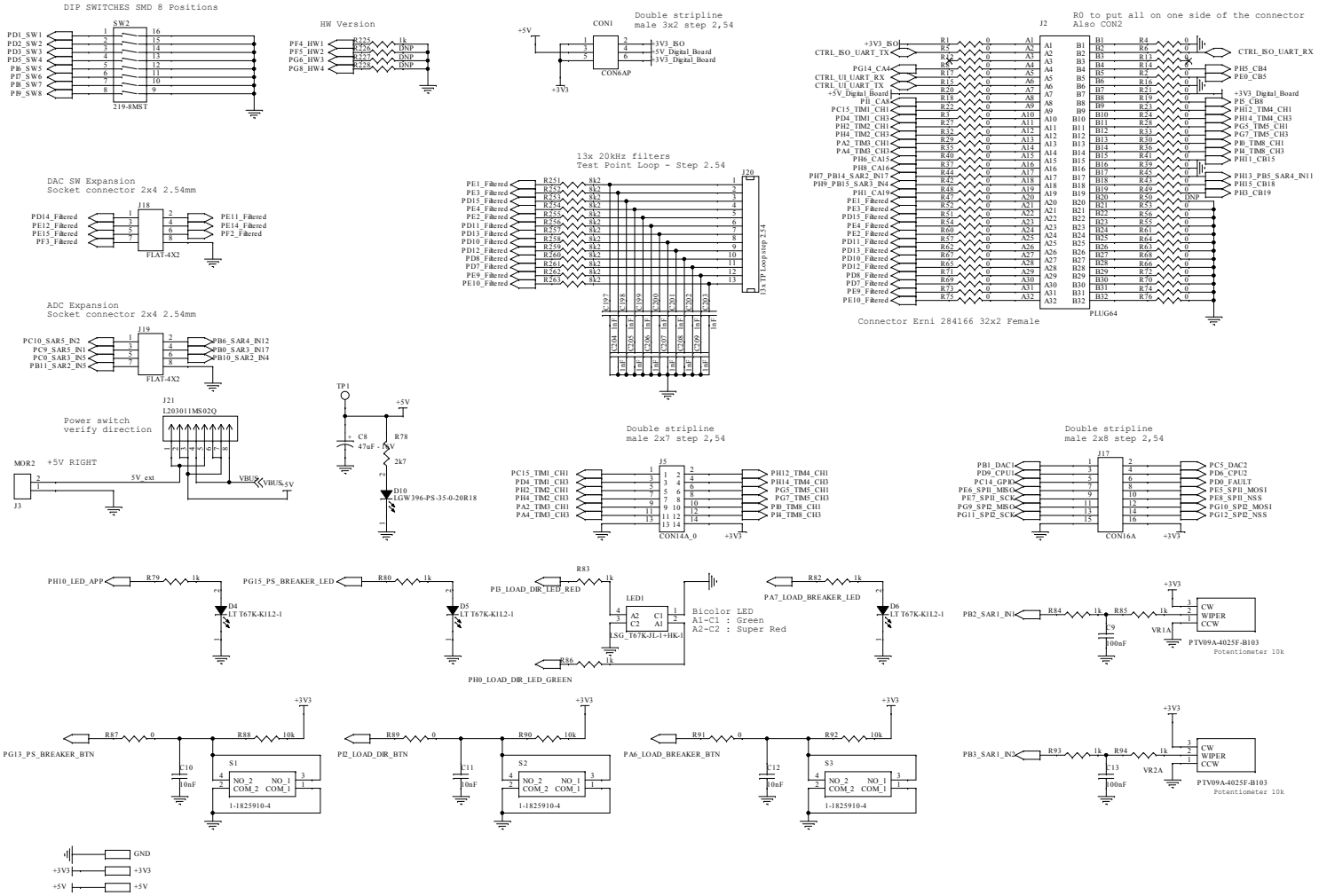


Figure 3. STEVAL-HILE1V1 - HIL board circuit schematic (2 of 6)

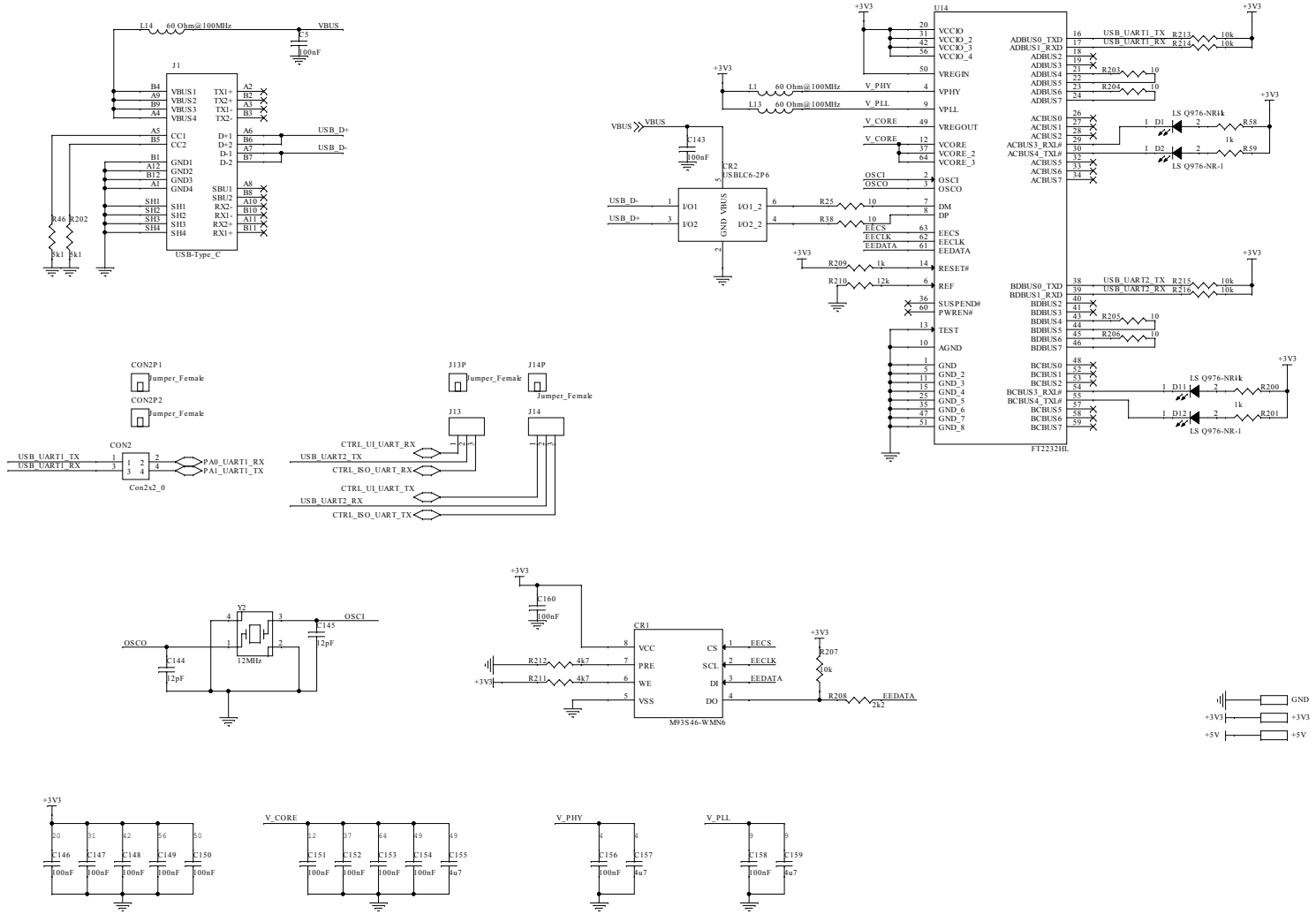


Figure 4. STEVAL-HILE1V1 - HIL board circuit schematic (3 of 6)

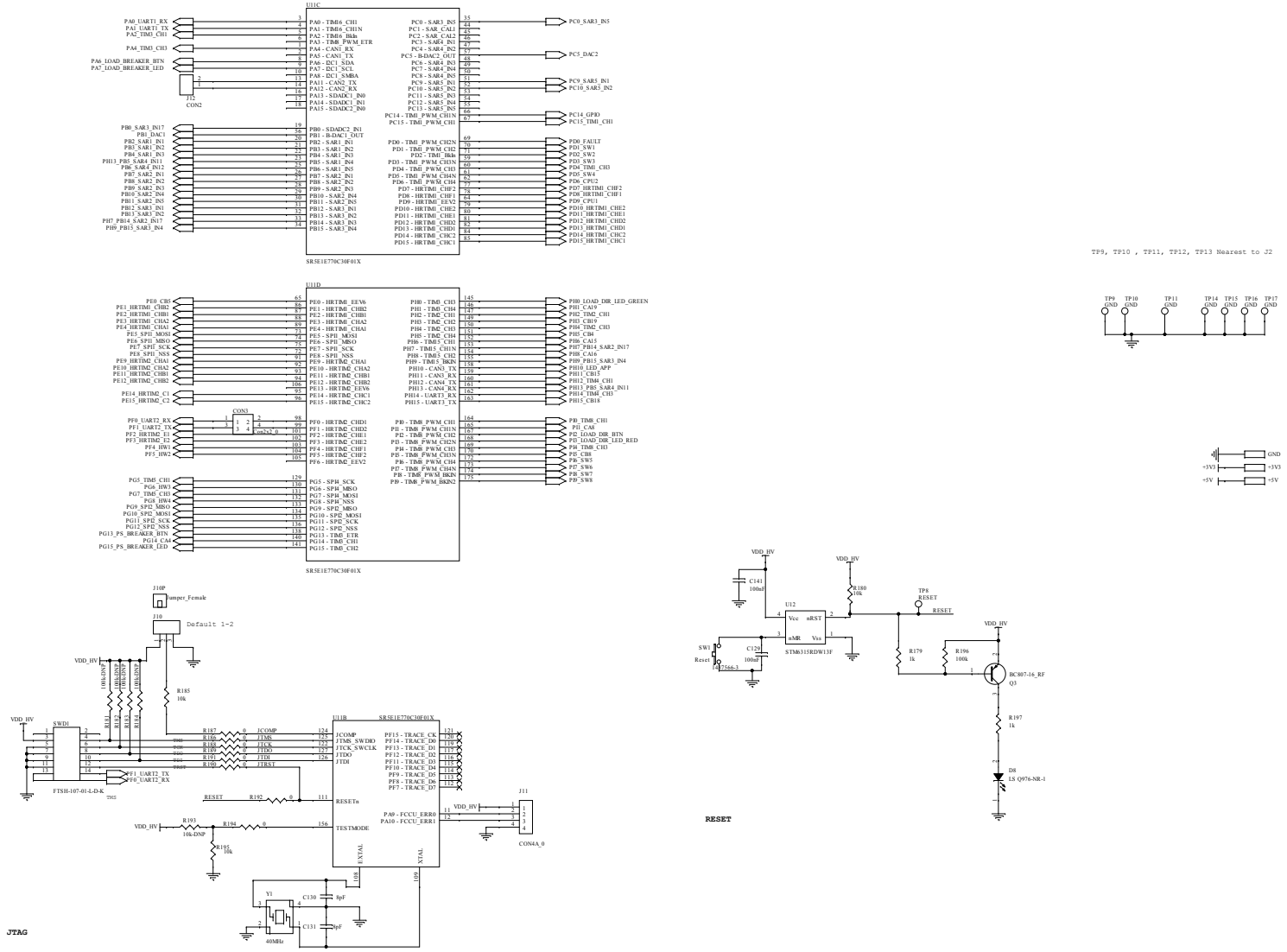
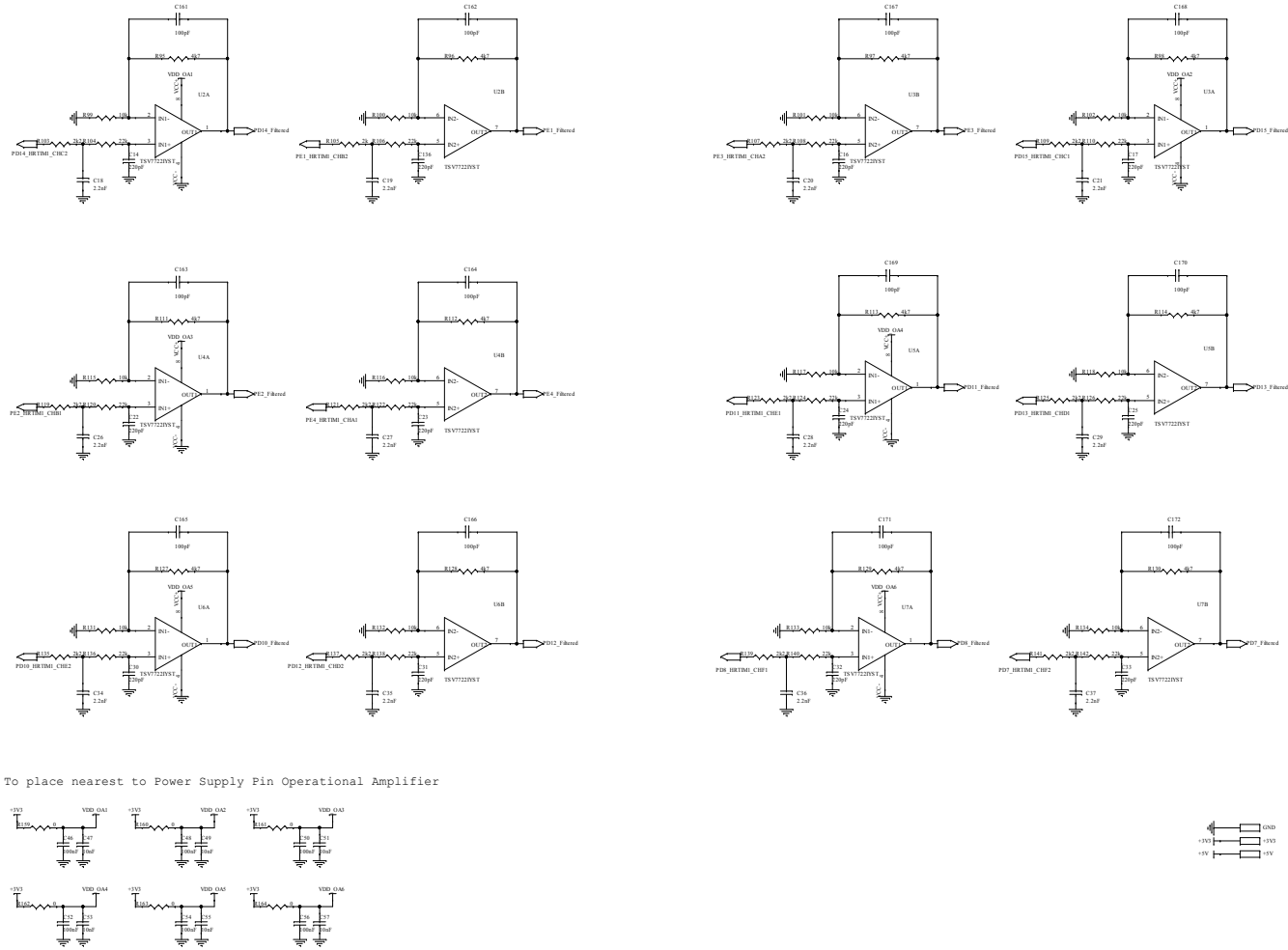
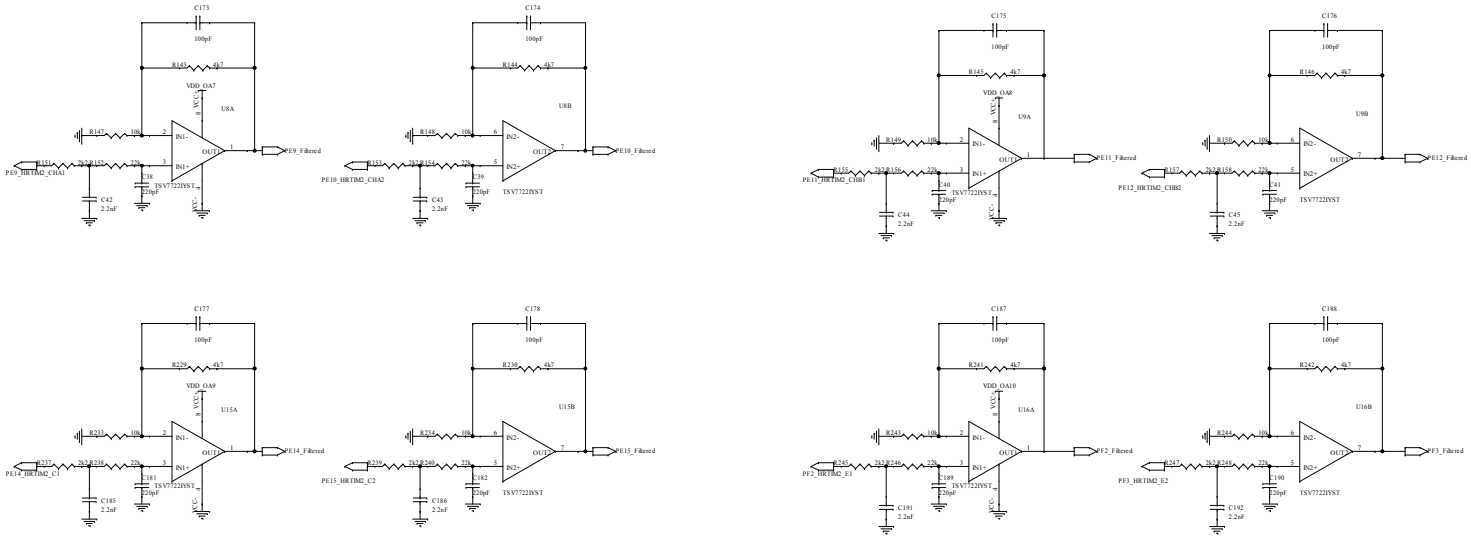


Figure 5. STEVAL-HILE1V1 - HIL board circuit schematic (4 of 6)



To place nearest to Power Supply Pin Operational Amplifier

Figure 6. STEVAL-HILE1V1 - HIL board circuit schematic (5 of 6)



To place nearest to Power Supply Pin Operational Amplifier

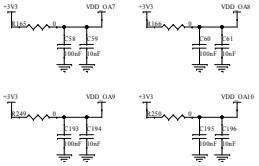


Figure 7. STEVAL-HILE1V1 - HIL board circuit schematic (6 of 6)

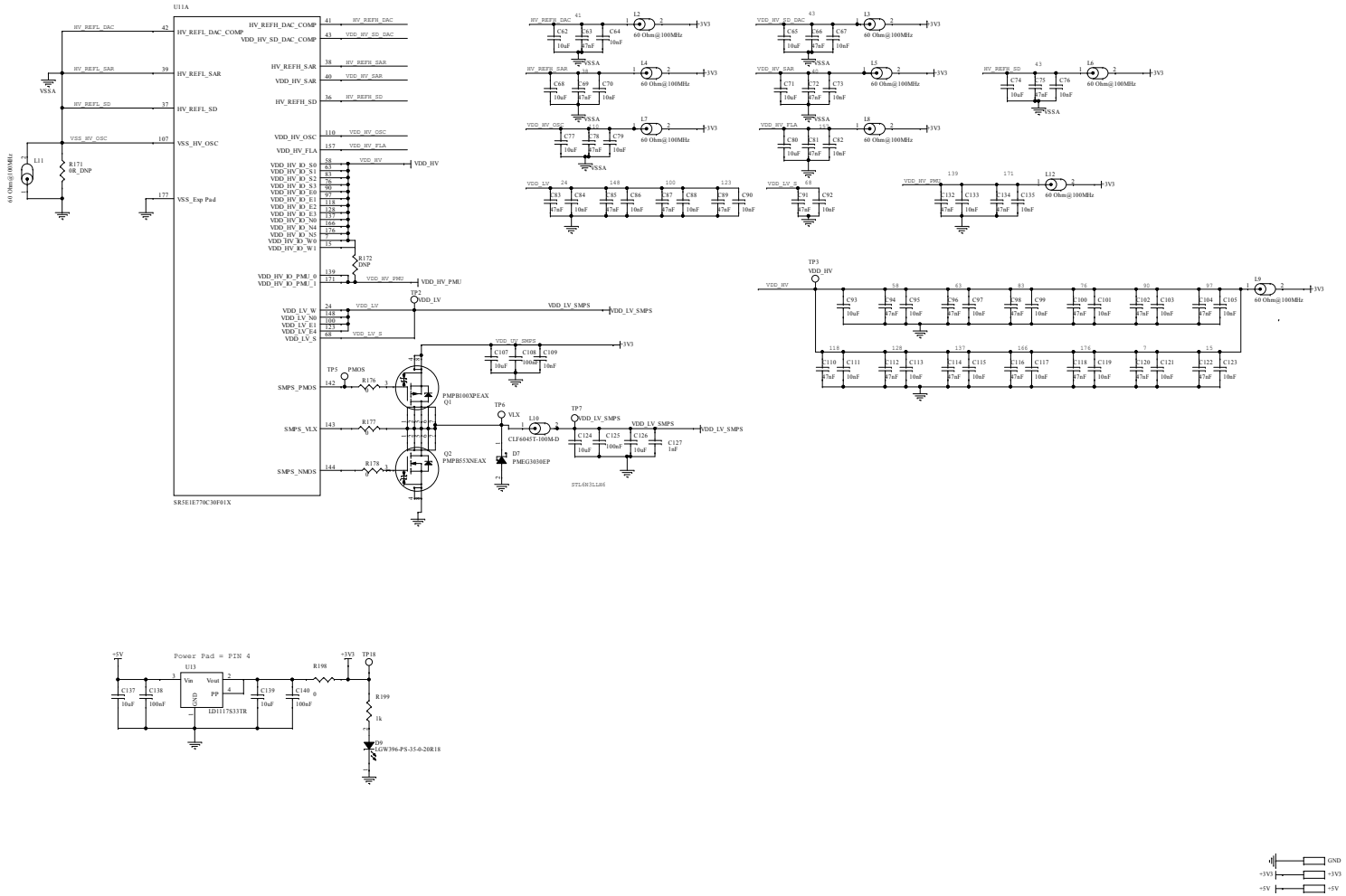
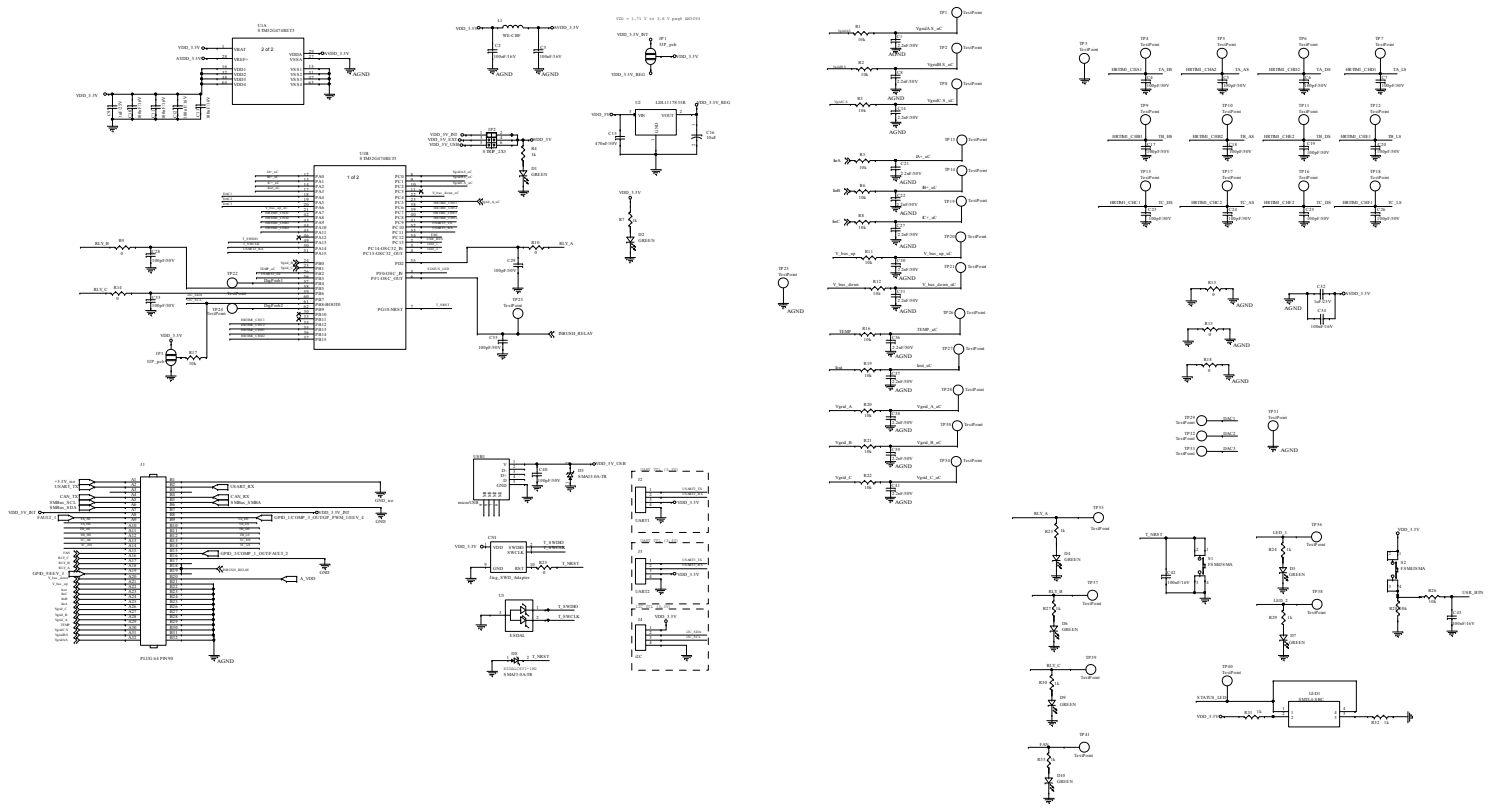


Figure 8. STEVAL-G474V1CB - Control board circuit schematic



3 Kit versions

Table 1. STEVAL-HILE1G4K1 versions

PCB version	Schematic diagrams	Bill of materials
STV$HILE1G4K1A (1)	STV$HILE1G4K1A schematic diagrams	STV$HILE1G4K1A bill of materials

1. *This code identifies the STEVAL-HILE1G4K1 evaluation kit first version. It is printed on the board PCB. The kit consists of a main board STEVAL-HILE1V1 whose version is identified by the code STV$HILE1V1A and a control board STEVAL-G474V1CB whose version is identified by the code STEVAL$G474V1CBA.*

Revision history

Table 2. **Document revision history**

Date	Revision	Changes
19-Jan-2026	1	Initial release.
03-Feb-2026	2	Updated Cover image.

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