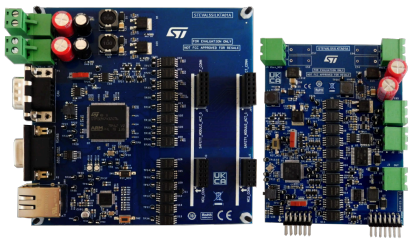
STEVAL-SILKT01

Data brief

Evaluation kit for industrial PLC solutions targeting SIL3 applications



Product summary	
Evaluation kit for industrial PLC solutions targeting SIL3 applications	STEVAL-SILKT01
Software for STEVAL-SILKT01	STSW-SILKT01
High-performance and DSP with DP-FPU, Arm Cortex-M7 MCU with 1MByte of Flash memory, 1MB RAM, 480 MHz CPU, L1 cache, external memory interface, JPEG codec, large set of peripherals	STM32H743ZG
Mainstream Arm Cortex-M4 MCU 170 MHz with 128 Kbytes of Flash memory, Math Accelerator, Medium Analog level integration	STM32G431RB
Applications	Programmable Logic Controllers (PLC)

Features

- Designed to meet IEC61508-2, EN 62061, EN ISO 13849-1, EN ISO 13849-2 for a SIL3/PLe achievement
- Dual core architecture based on STM32H743ZG and STM32G431RB
- Dual digital outputs IPS1025H, IPS4260L
- Dual digital inputs CLT03-1SC3
- Full diagnostic coverage >90%
- Galvanic isolation for data transmission, and digital I/O signals using STISO621
- Redundancy on board, at hardware level and data processing
- Real time communication supporting Ethernet technology for Ethernet/IP, and differential serial communication for RS485 and CAN
- Overload and overtemperature protections, integrated on board at device level

Description

The STEVAL-SILKT01 is an evaluation kit designed to implement a PLC solution with hardware architecture designed to meet the requirements coming from functional safety standards IEC61508, EN 62061, EN ISO 13849-1, EN ISO 13849-2, to enable the use as a reference design for factory automation use cases having a hardware platform with safety integrity level SIL3.

The evaluation kit STEVAL-SILKT01 contains one mother board STEVAL-SILKTA01 (main board) and two daughter boards STEVAL-SILKTB01 (actuation board).

The board architecture offers a dual-core data processing based on STM32H743ZG for the STEVAL-SILKTA01 and on STM32G431RB for the STEVAL-SILKTB01.

On the main board (STEVAL-SILKTA01) are available three connectivity interfaces, two of them with differential communication working on RS485 and CAN physical layer, the other one with Ethernet technology to support the Ethernet/IP.

The hardware is coming with the firmware package STSW-SILKT01 based on the STM32Cube architecture and consisting of: application layer, drivers layer with BSP/CMSIS and HAL library, middleware layer.

1 Industrial safety features

On both boards (STEVAL-SILKTA01 and STEVAL-SILKTB01) have been implemented architectural circuitries, able to:

- Cover diagnostic functions to achieve a coverage DC > 90%
- Implement redundancy on digital input using single channel digital input CLT03-1SC3
- Implement redundancy on digital output using high-side and low-side architecture (IPS1025H and IPS4260L respectively)
- Implement redundancy on the execution of safety functions
- Implement redundancy on digital output driving signals using dedicated logic gates
- Implement different power management circuitry to differentiate the power management unit for safety and non-safety related blocks

The STEVAL-SILKTA01 (main board) as well as the STEVAL-SILKTB01 (actuation board), embeds an isolation barrier based on STISO621, managing:

- Serial communication between STM32H743ZG and STM32G431RB
- Digital input detection
- Digital output driving
- Diagnostic signalization for overload and overtemperature.

2 Schematic diagrams

Figure 1. STEVAL-SILKTA01 circuit schematic (1 of 21)

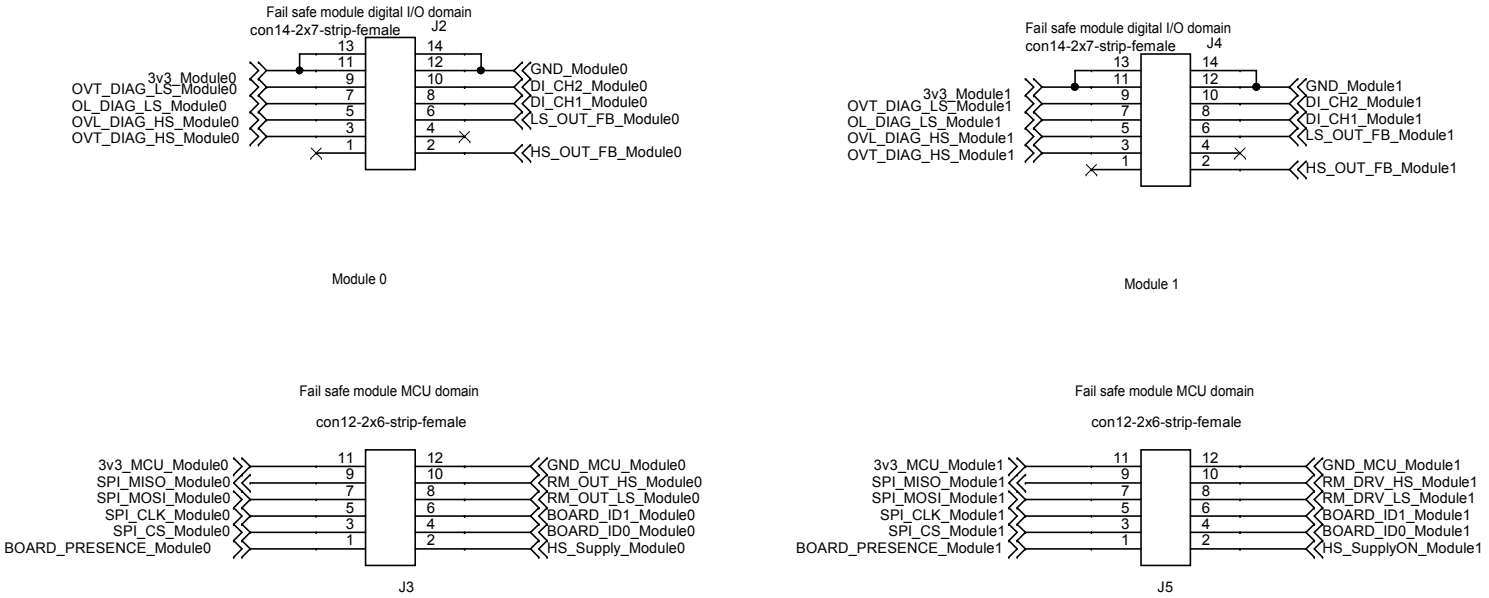


Figure 2. STEVAL-SILKTA01 circuit schematic (2 of 21)

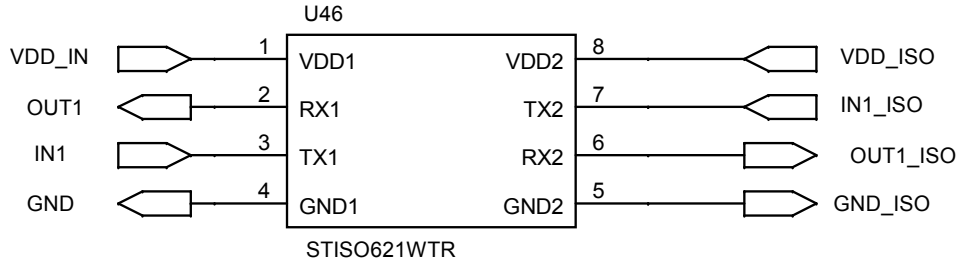


Figure 3. STEVAL-SILKTA01 circuit schematic (3 of 21)

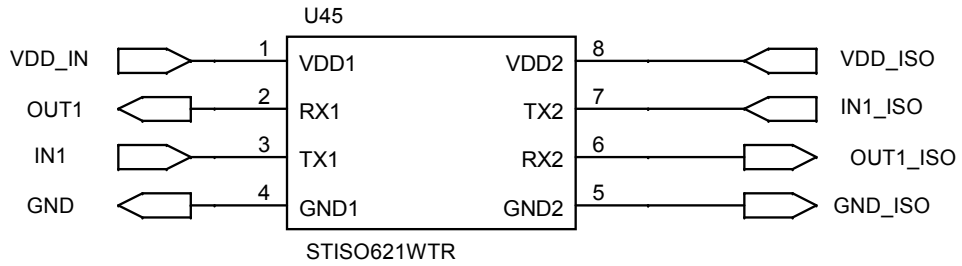


Figure 4. STEVAL-SILKTA01 circuit schematic (4 of 21)

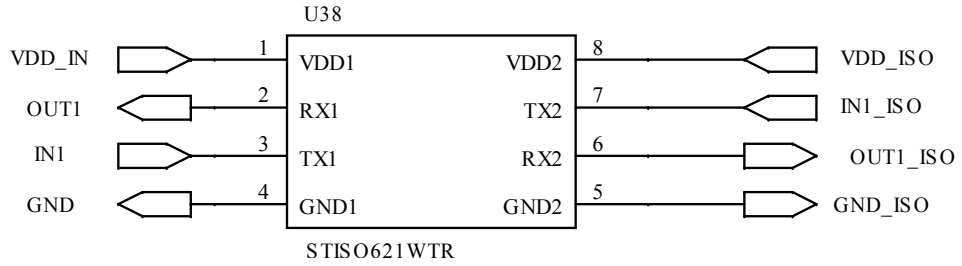


Figure 5. STEVAL-SILKTA01 circuit schematic (5 of 21)

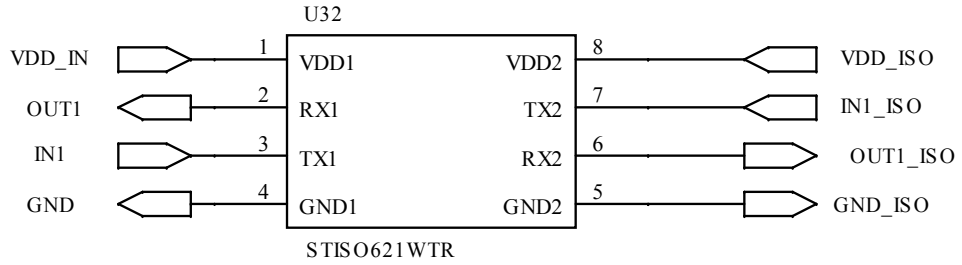


Figure 6. STEVAL-SILKTA01 circuit schematic (6 of 21)

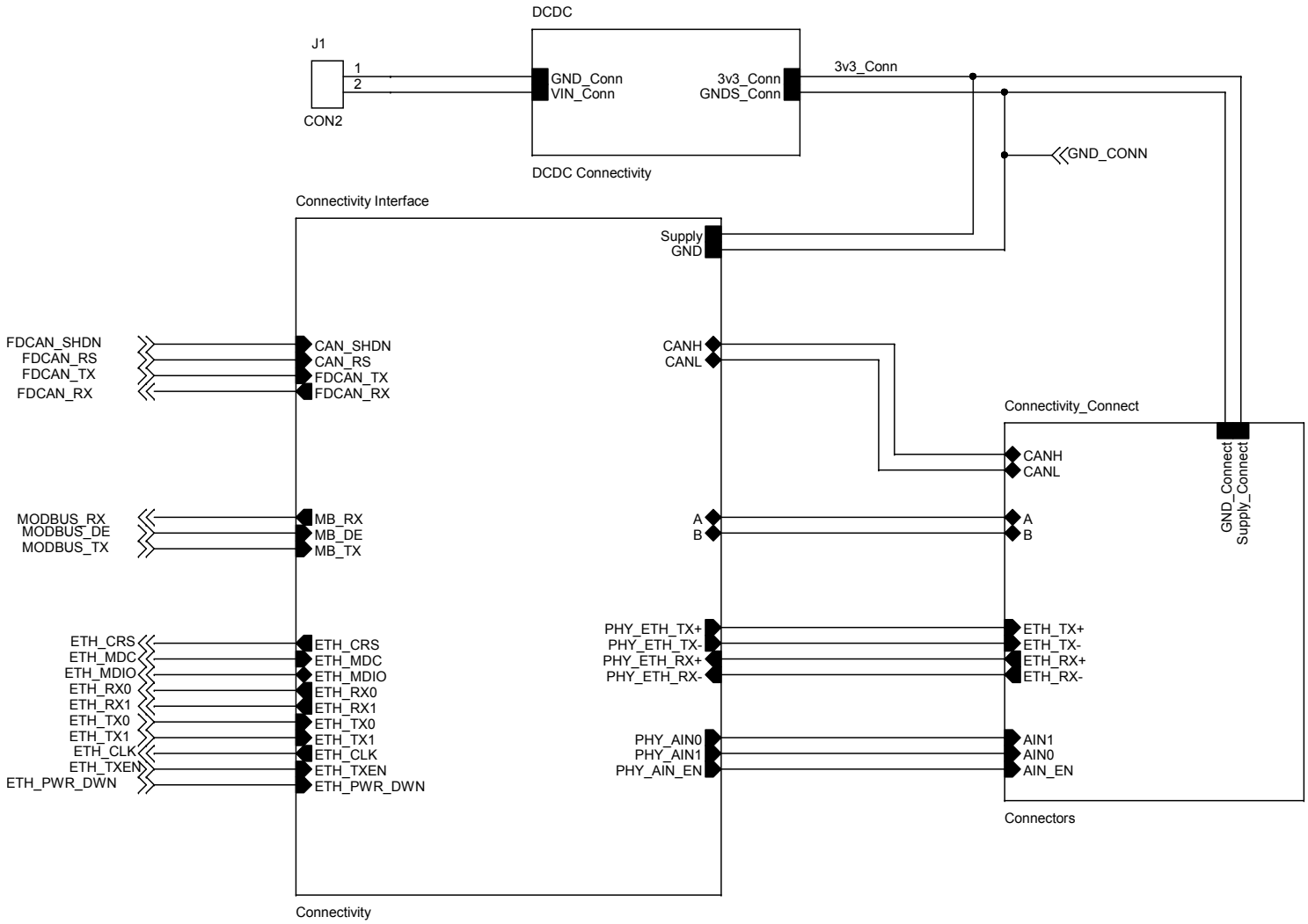


Figure 7. STEVAL-SILKTA01 circuit schematic (7 of 21)

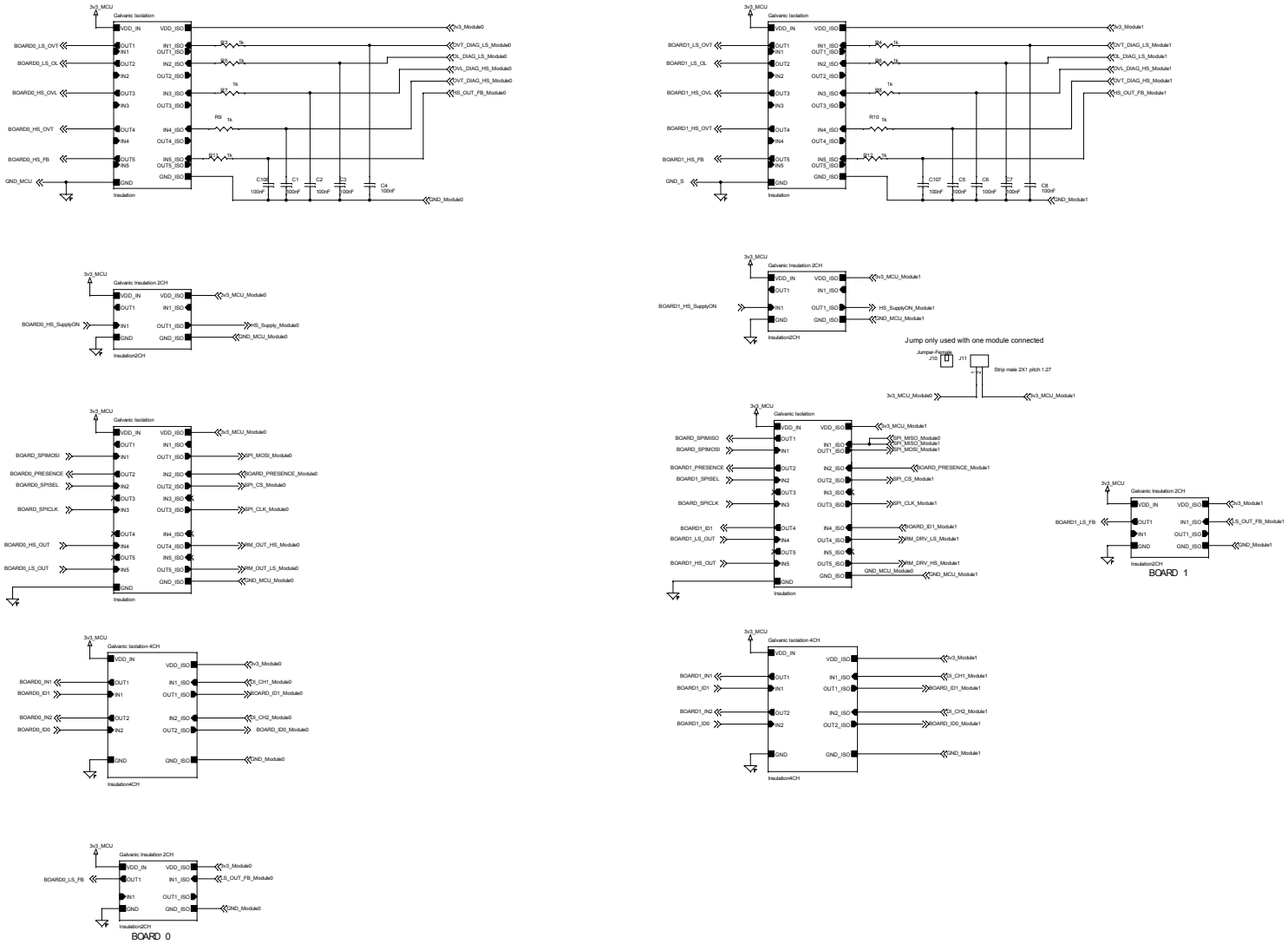


Figure 8. STEVAL-SILKTA01 circuit schematic (8 of 21)

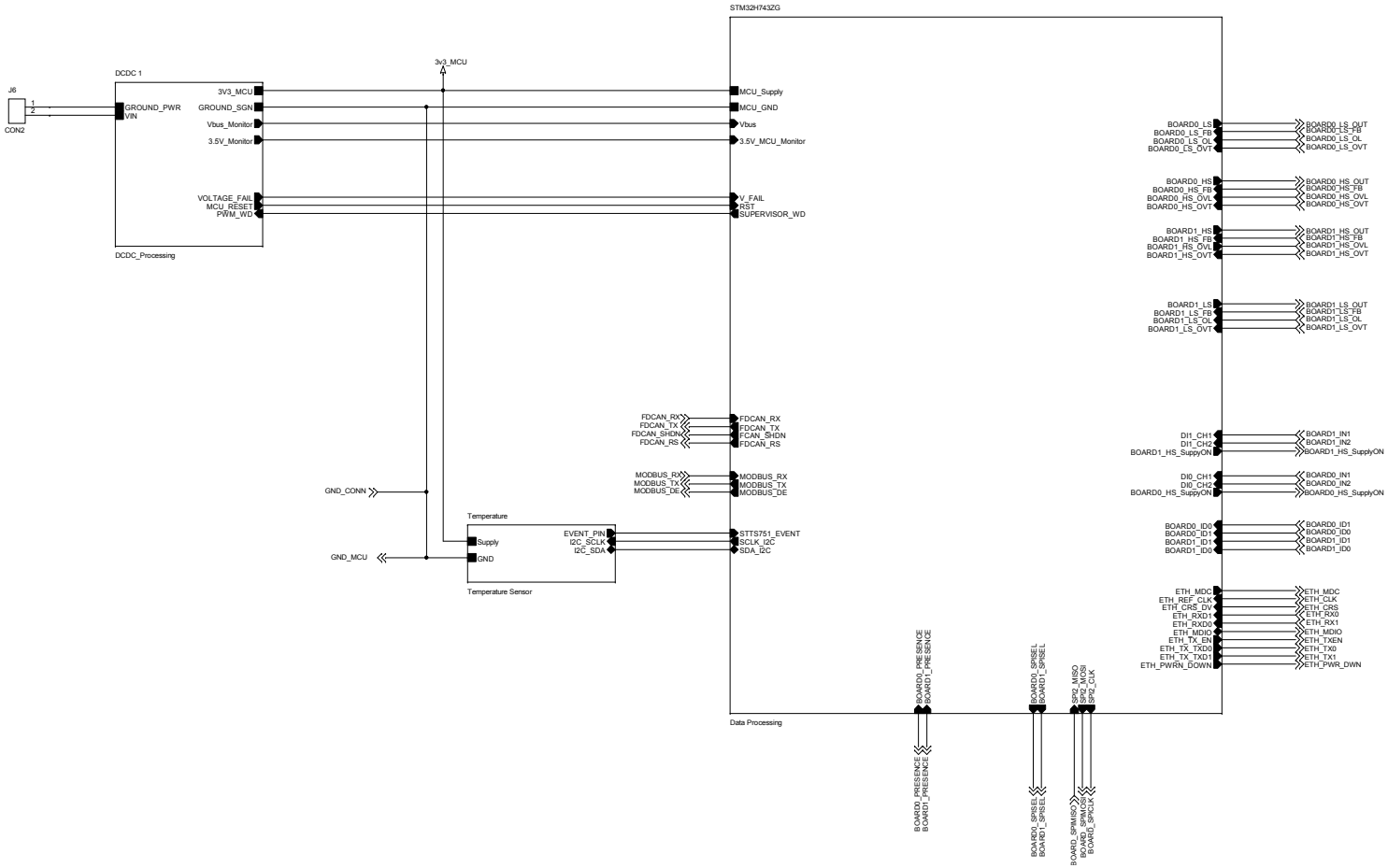


Figure 9. STEVAL-SILKTA01 circuit schematic (9 of 21)

Figure 10. STEVAL-SILKTA01 circuit schematic (10 of 21)

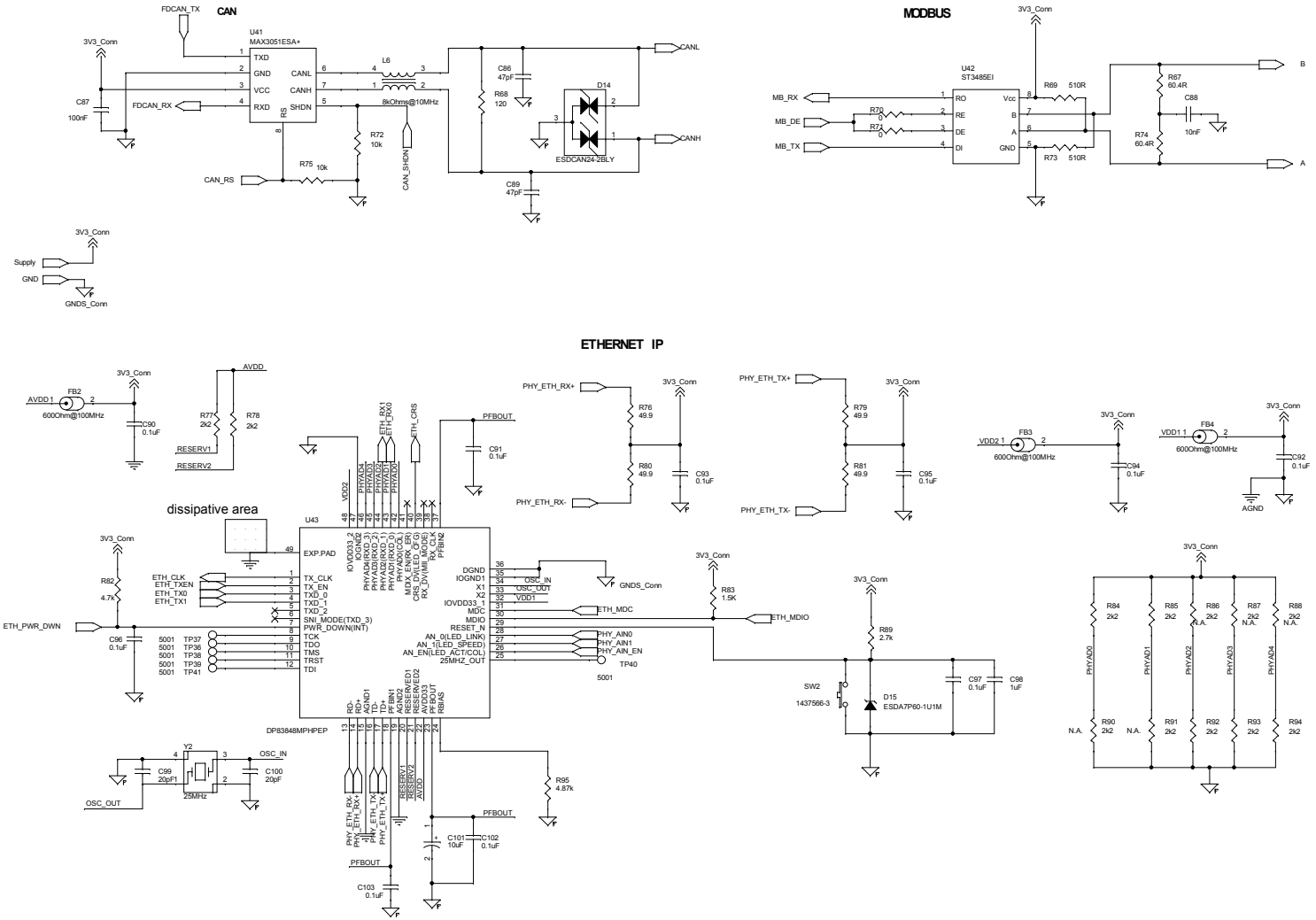


Figure 11. STEVAL-SILKTA01 circuit schematic (11 of 21)

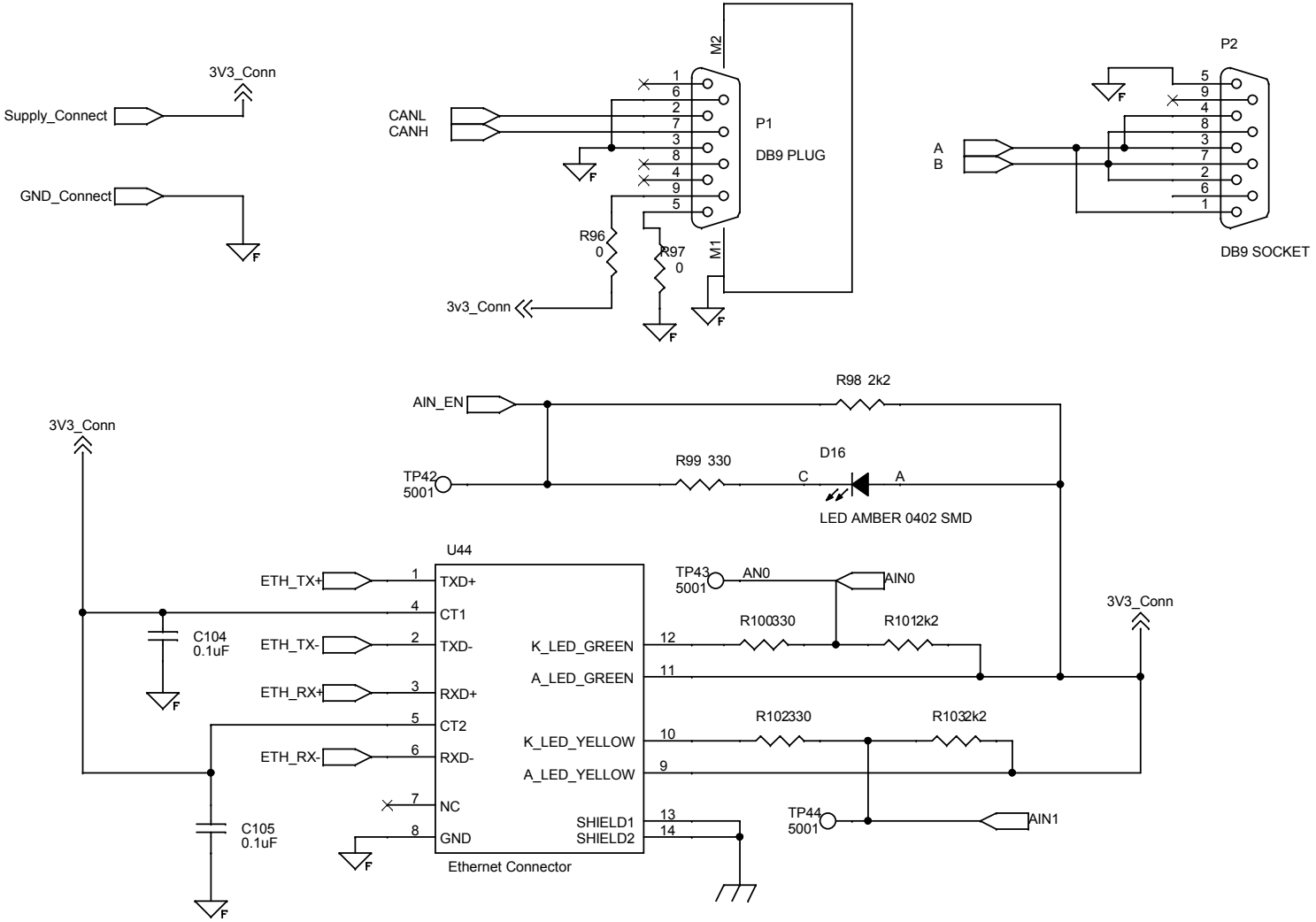


Figure 12. STEVAL-SILKTA01 circuit schematic (12 of 21)

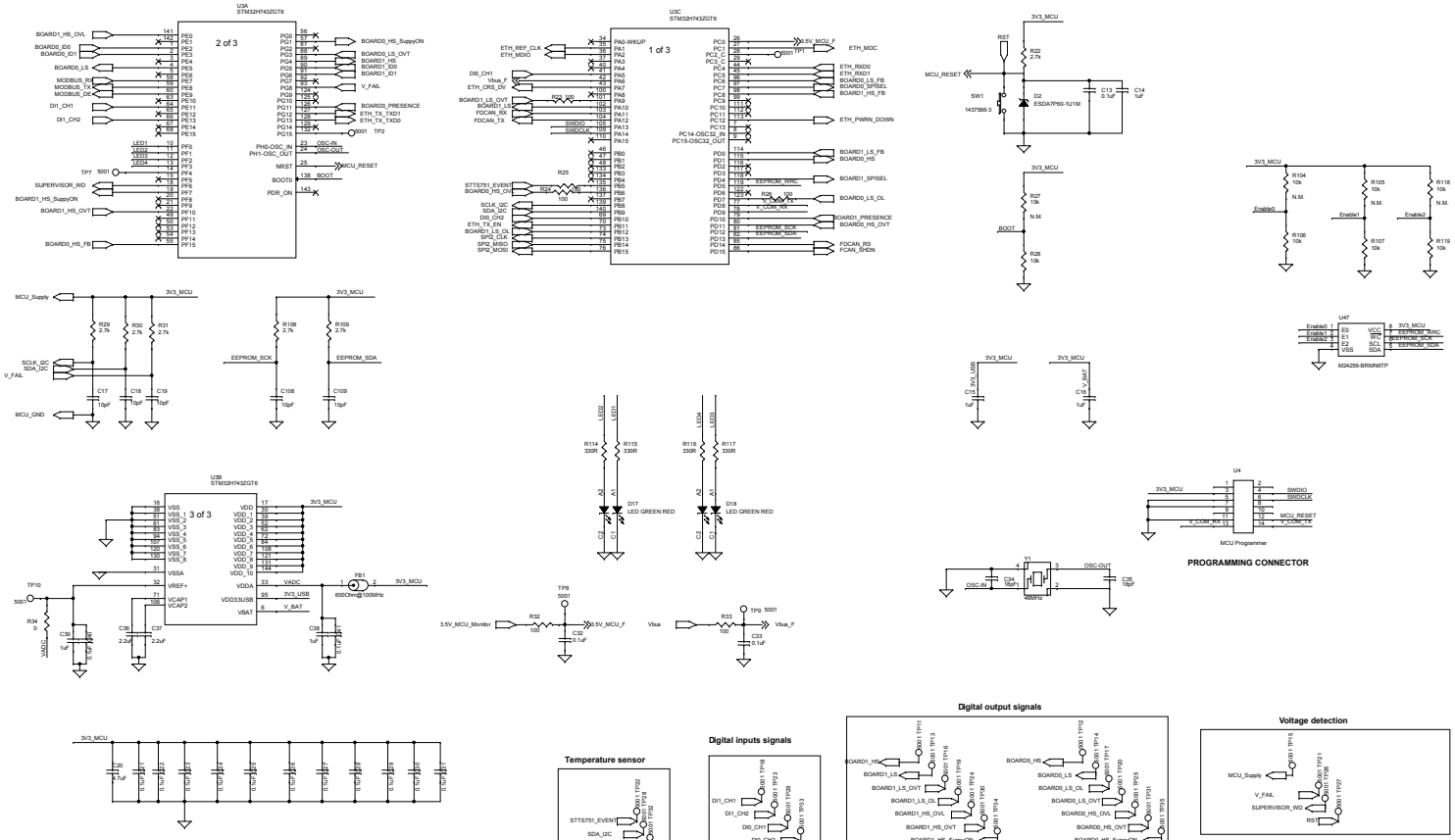


Figure 13. STEVAL-SILKTA01 circuit schematic (13 of 21)

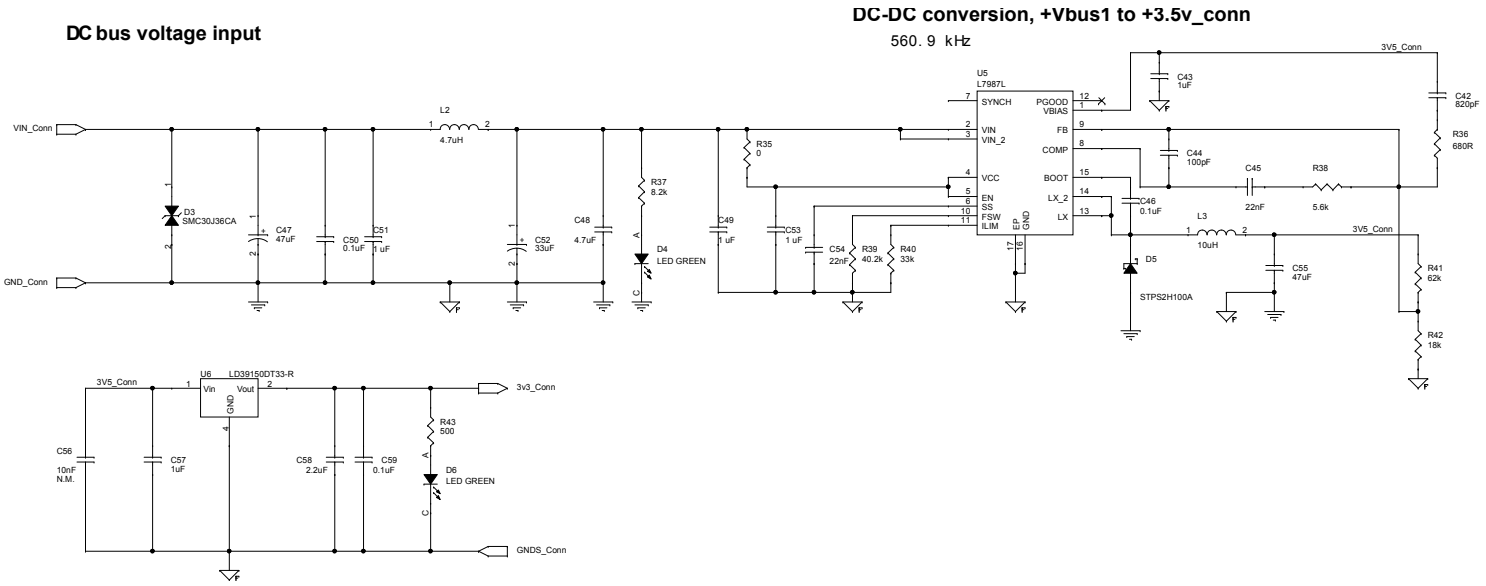


Figure 14. STEVAL-SILKTA01 circuit schematic (14 of 21)

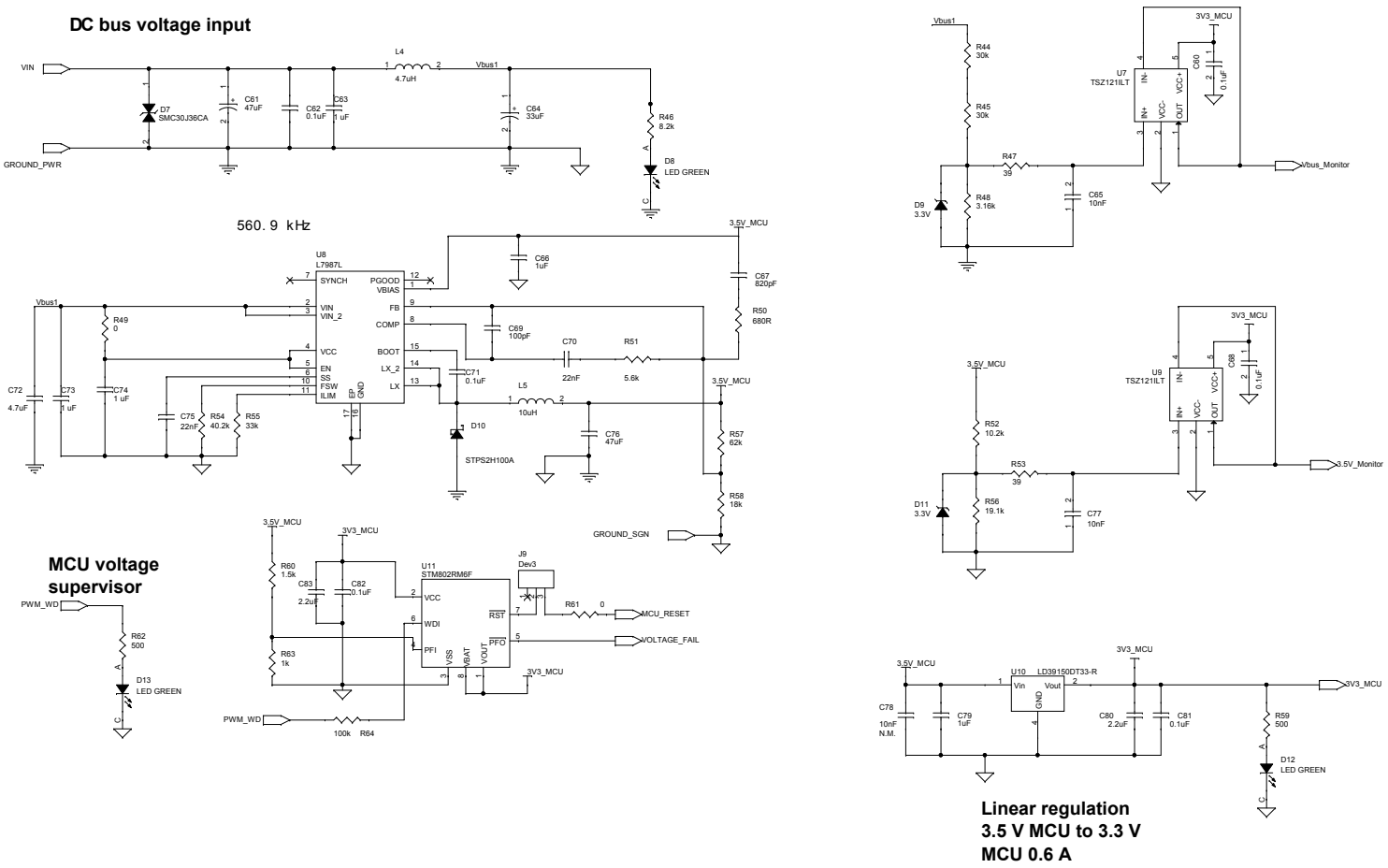


Figure 15. STEVAL-SILKTA01 circuit schematic (15 of 21)

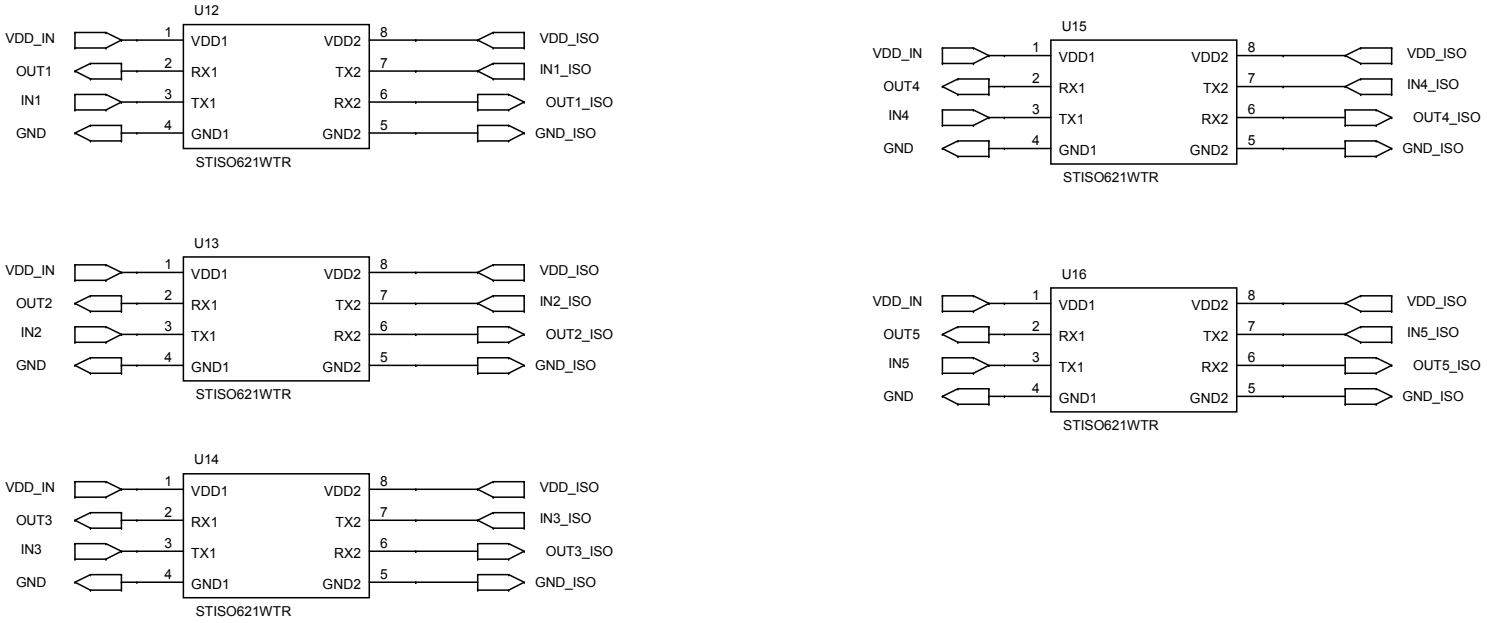


Figure 16. STEVAL-SILKTA01 circuit schematic (16 of 21)

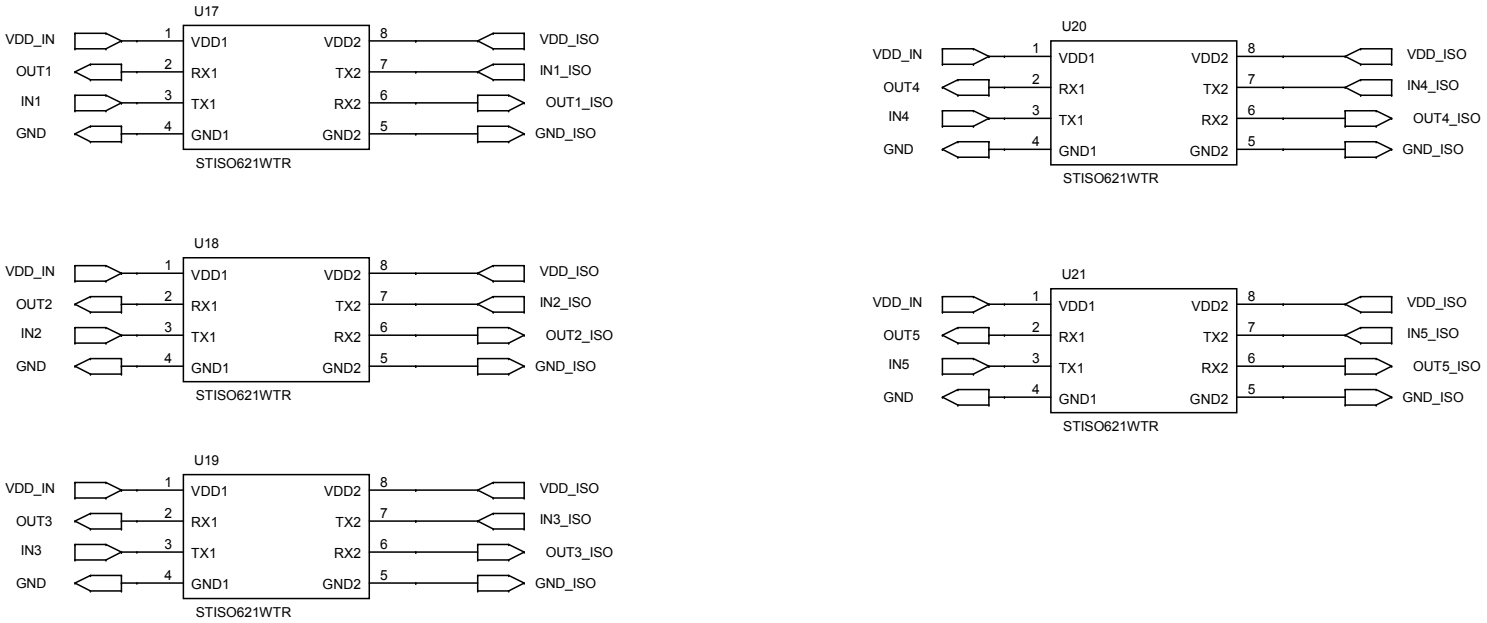


Figure 17. STEVAL-SILKTA01 circuit schematic (17 of 21)

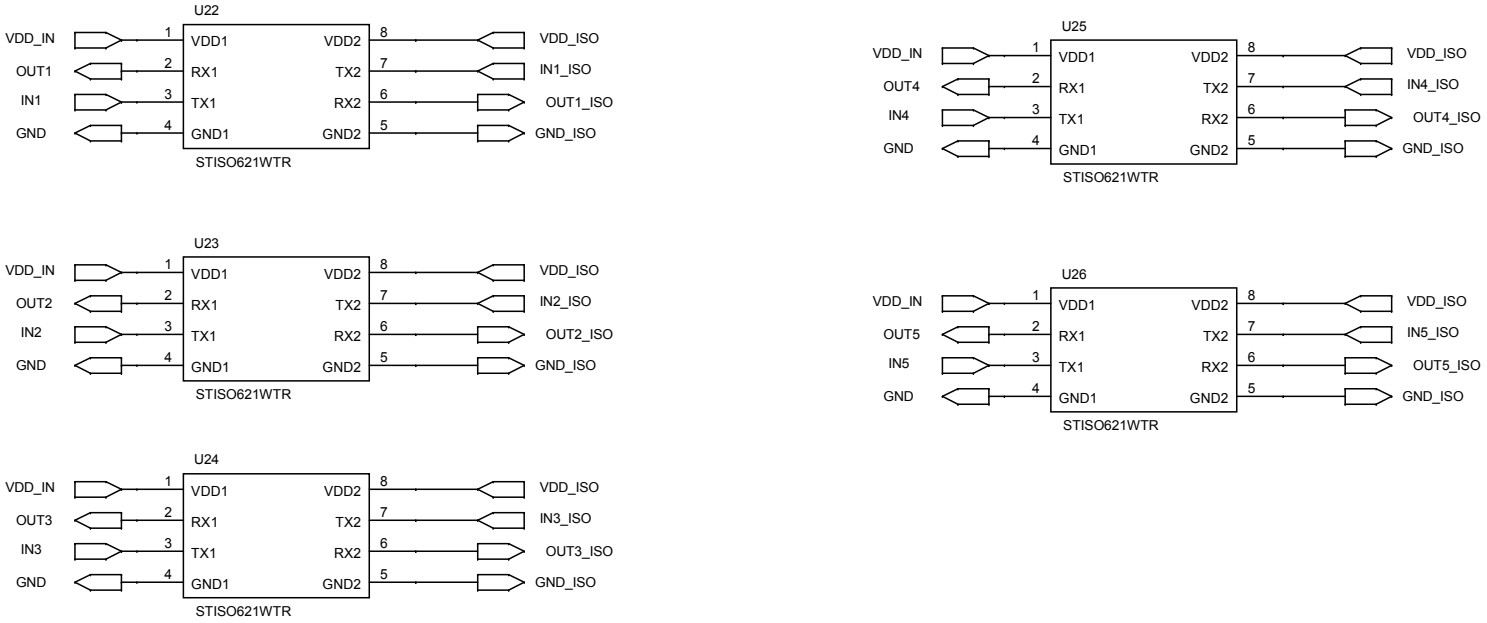


Figure 18. STEVAL-SILKTA01 circuit schematic (18 of 21)

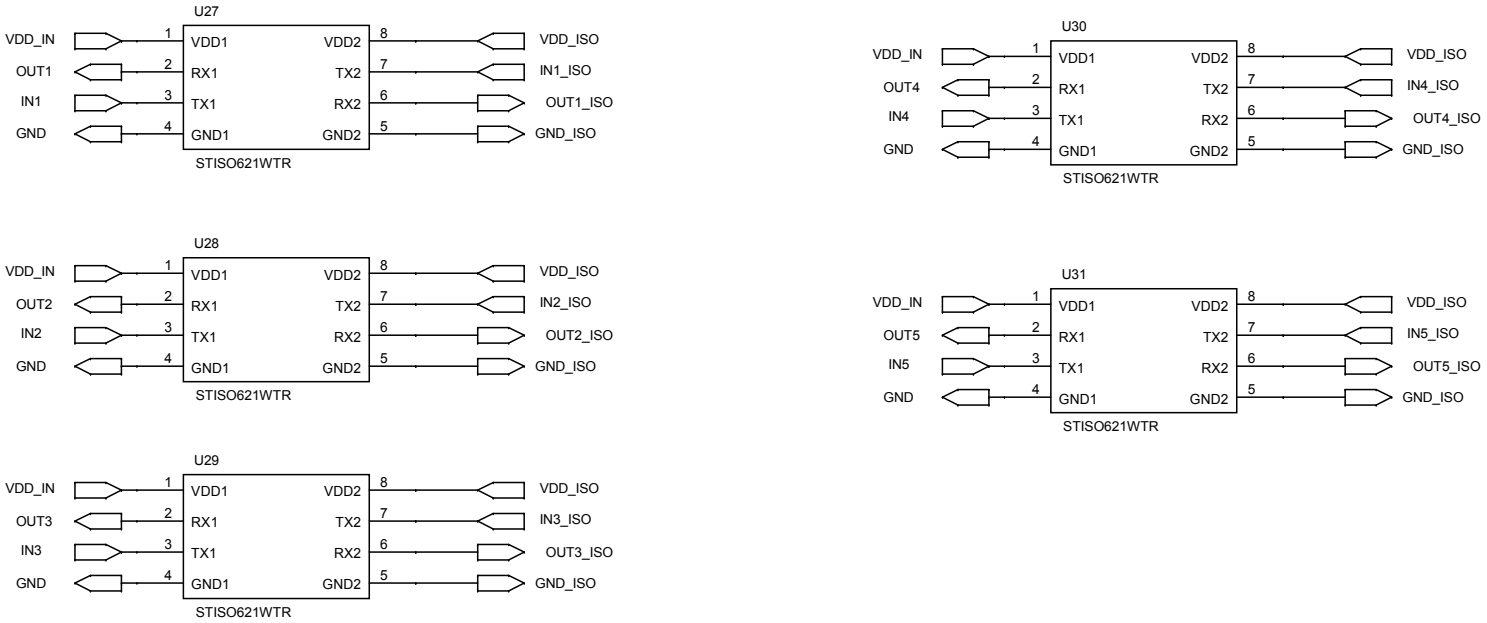


Figure 19. STEVAL-SILKTA01 circuit schematic (19 of 21)

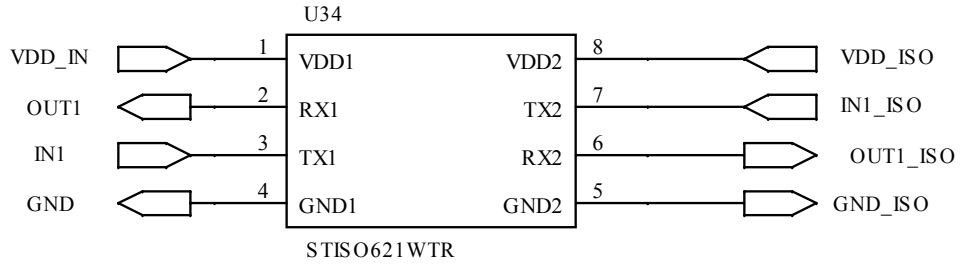


Figure 20. STEVAL-SILKTA01 circuit schematic (20 of 21)

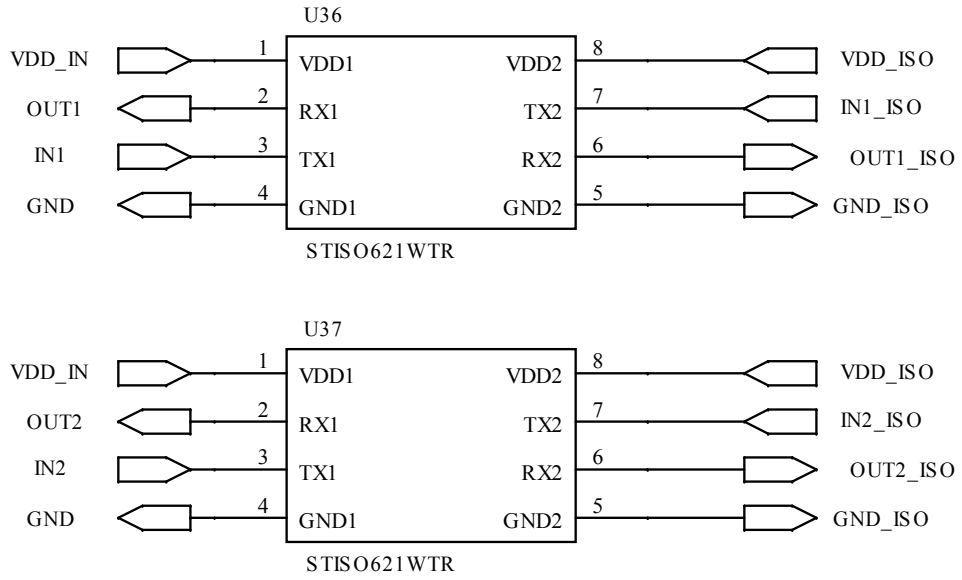


Figure 21. **STEVAL-SILKTA01 circuit schematic (21 of 21)**

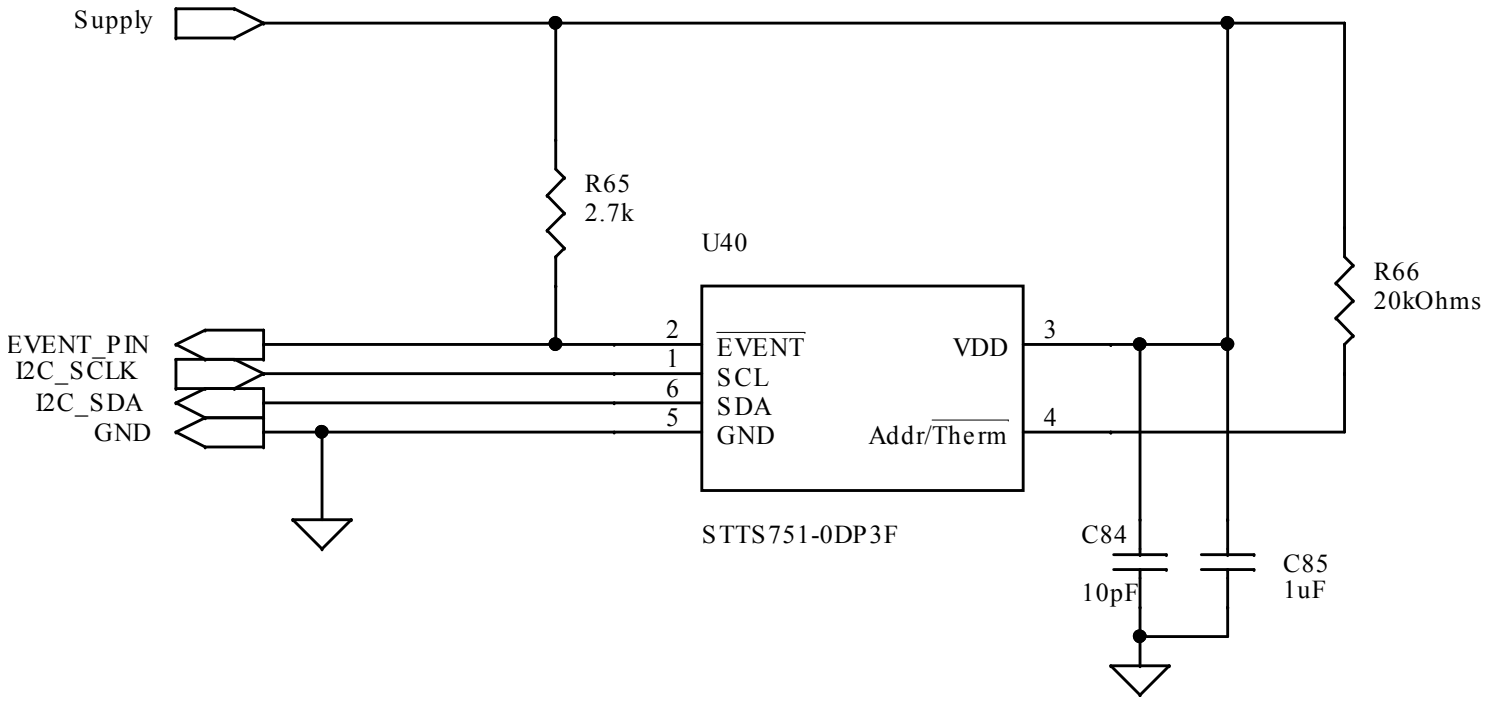


Figure 22. STEVAL-SILKTB01 circuit schematic (1 of 12)

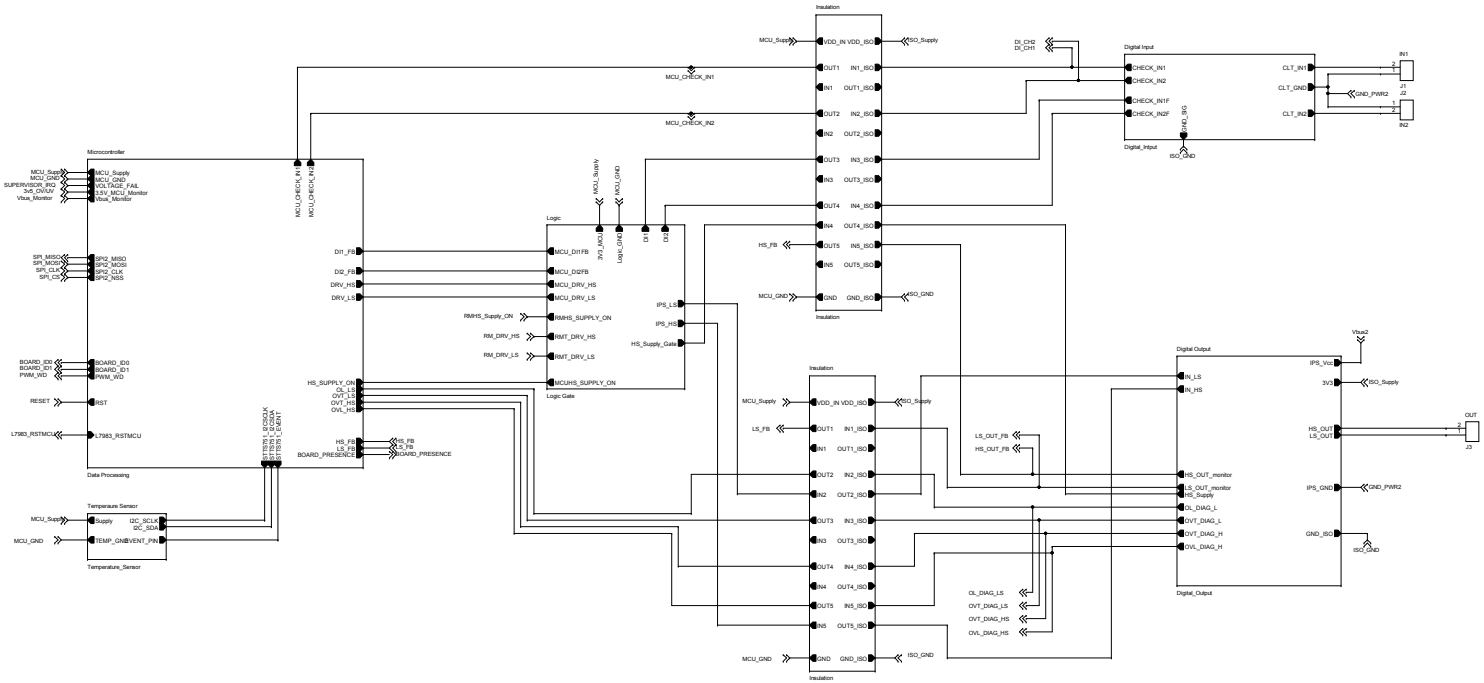


Figure 23. STEVAL-SILKTB01 circuit schematic (2 of 12)

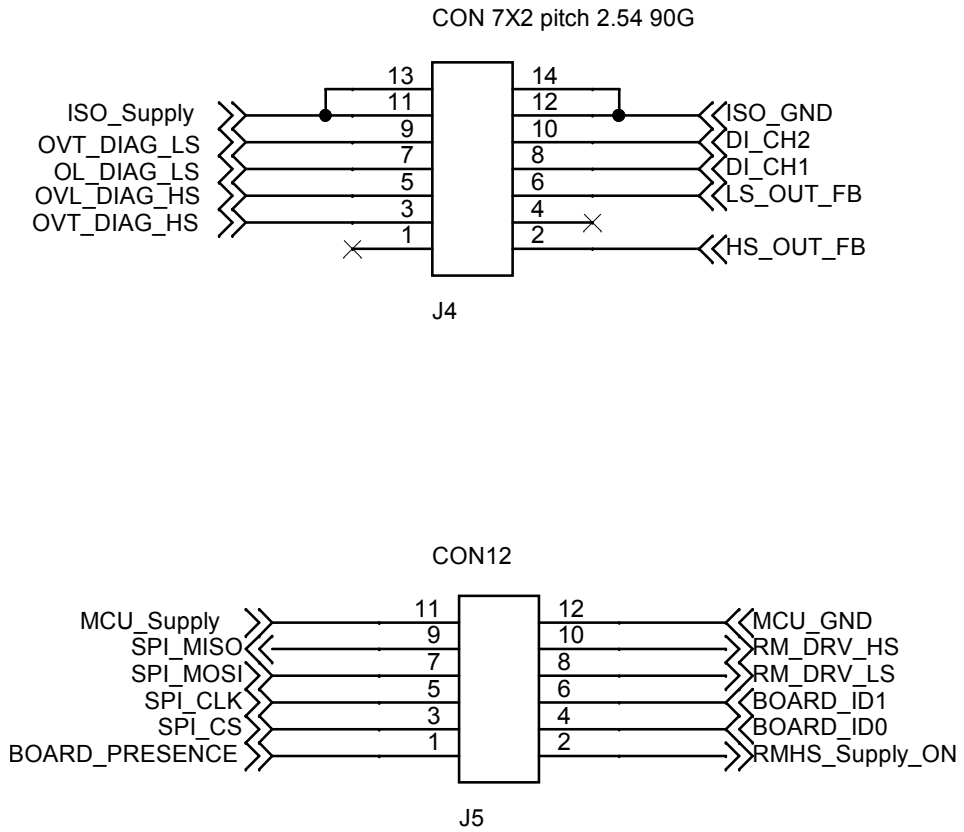


Figure 24. **STEVAL-SILKTB01 circuit schematic (3 of 12)**

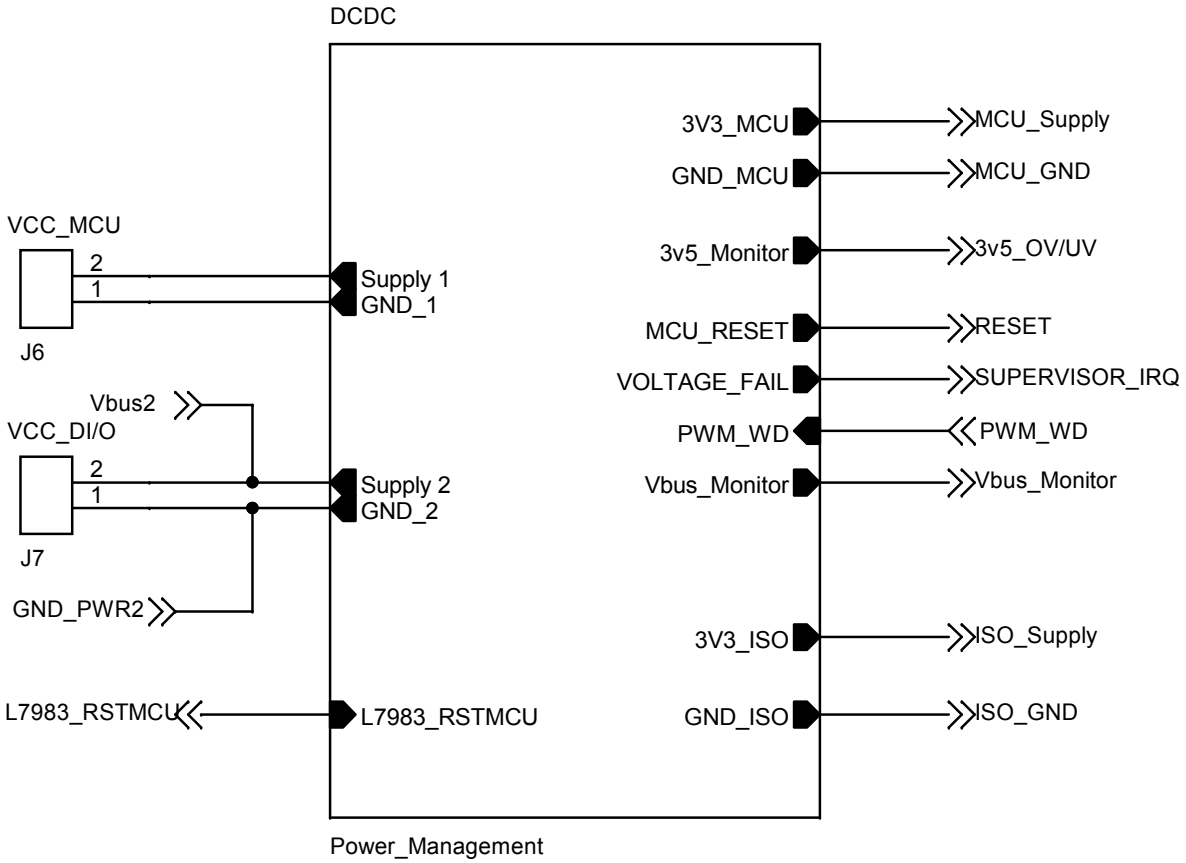


Figure 25. **STEVAL-SILKTB01 circuit schematic (4 of 12)**

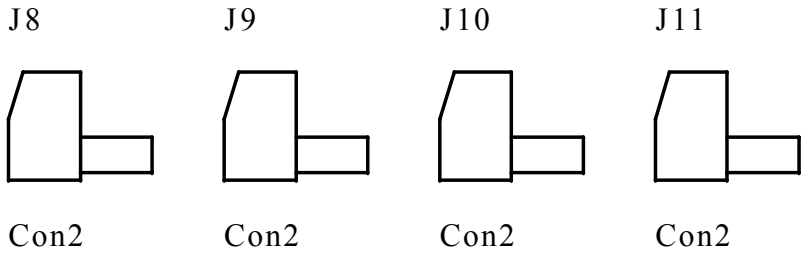


Figure 26. STEVAL-SILKTB01 circuit schematic (5 of 12)

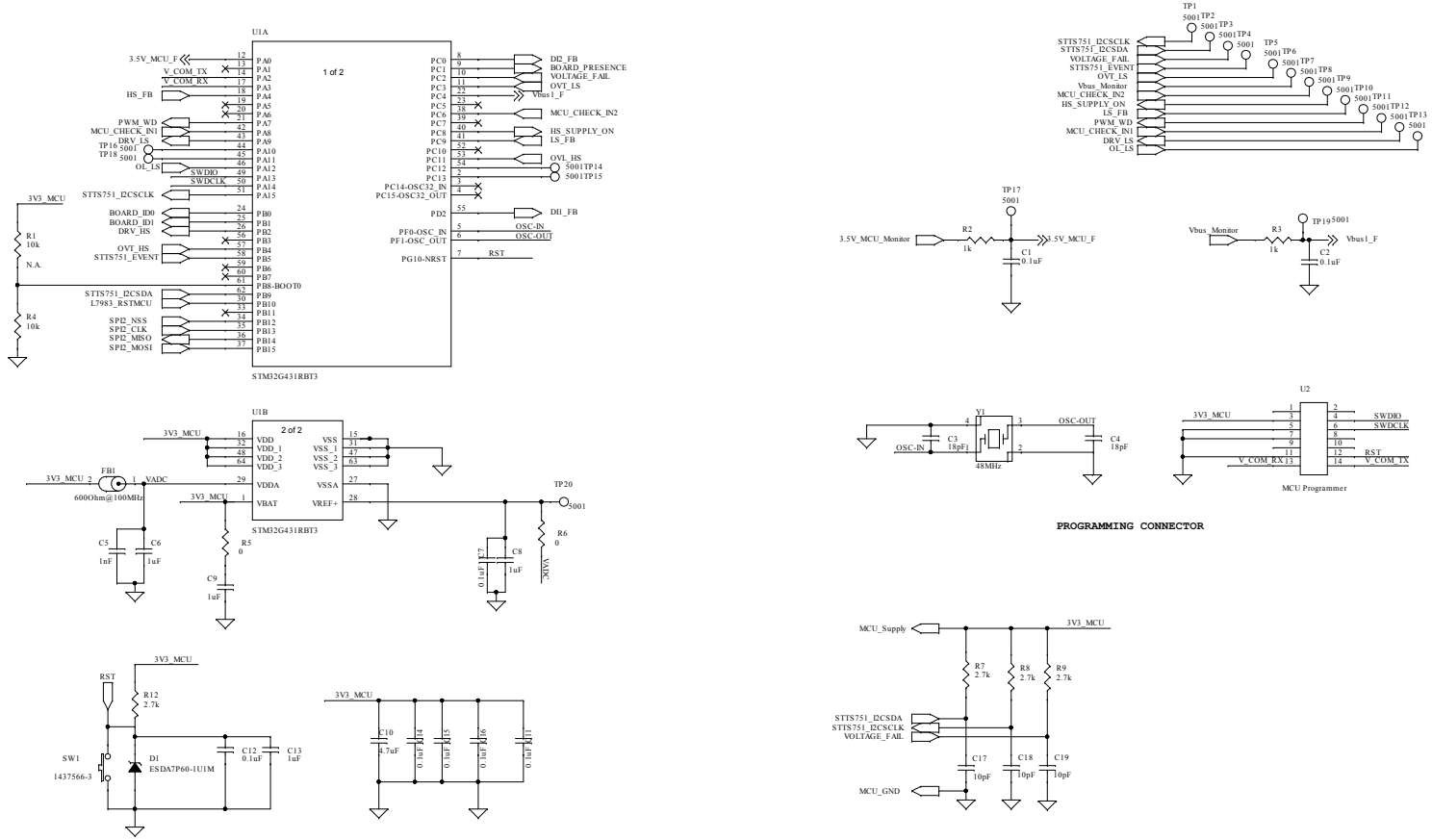


Figure 27. **STEVAL-SILKTB01 circuit schematic (6 of 12)**

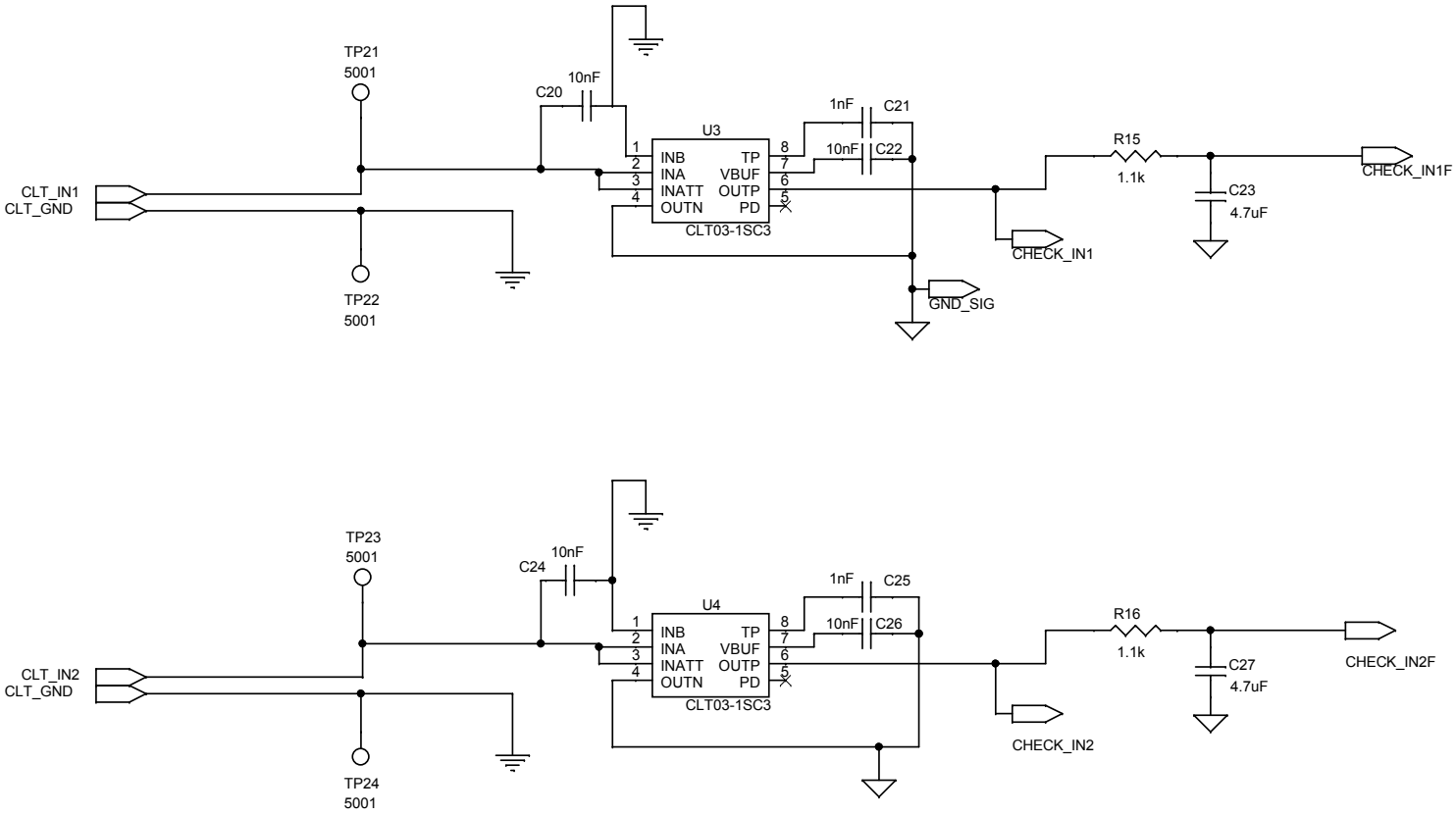


Figure 28. **STEVAL-SILKTB01 circuit schematic (7 of 12)**

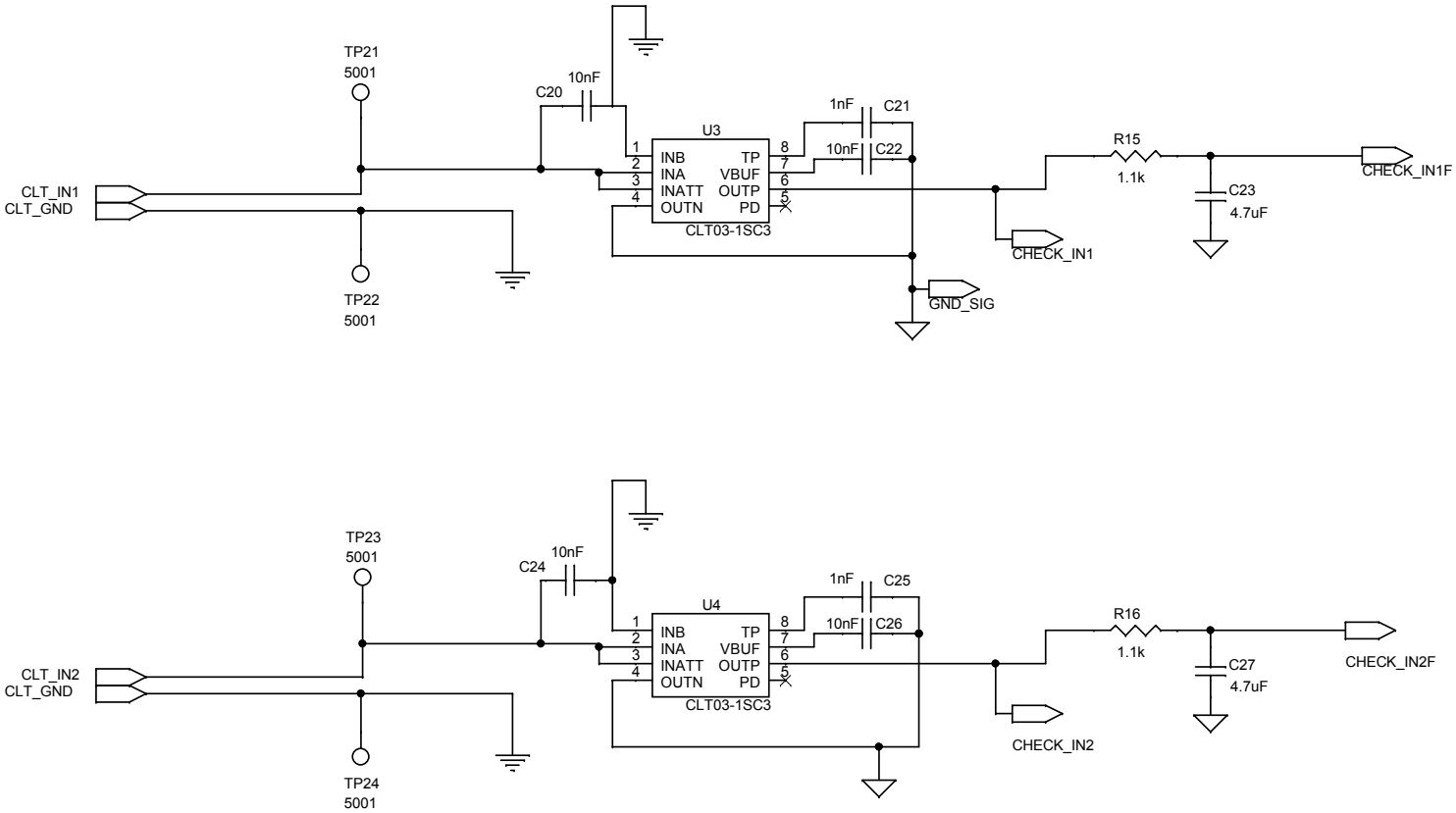


Figure 29. **STEVAL-SILKTB01 circuit schematic (8 of 12)**

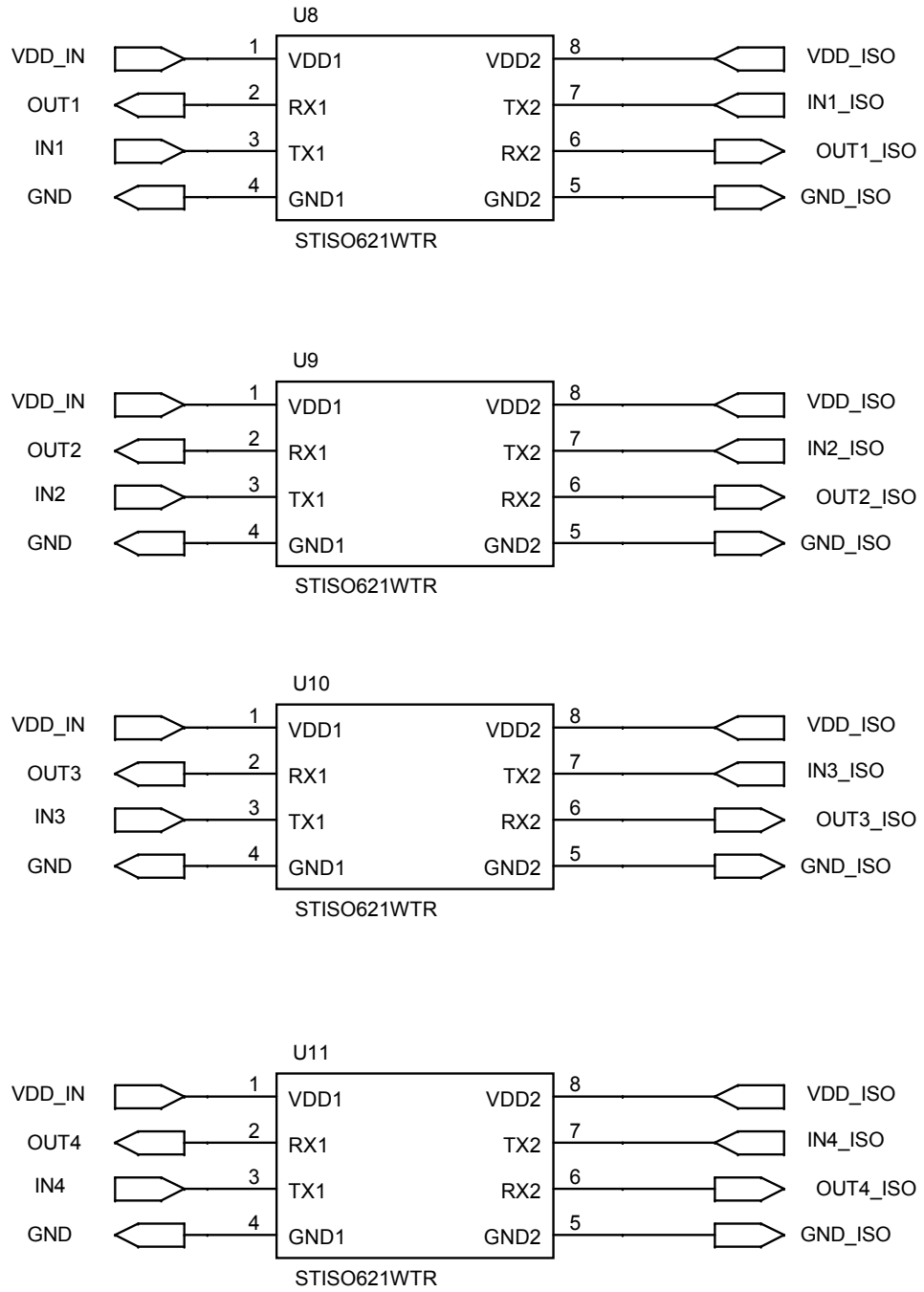
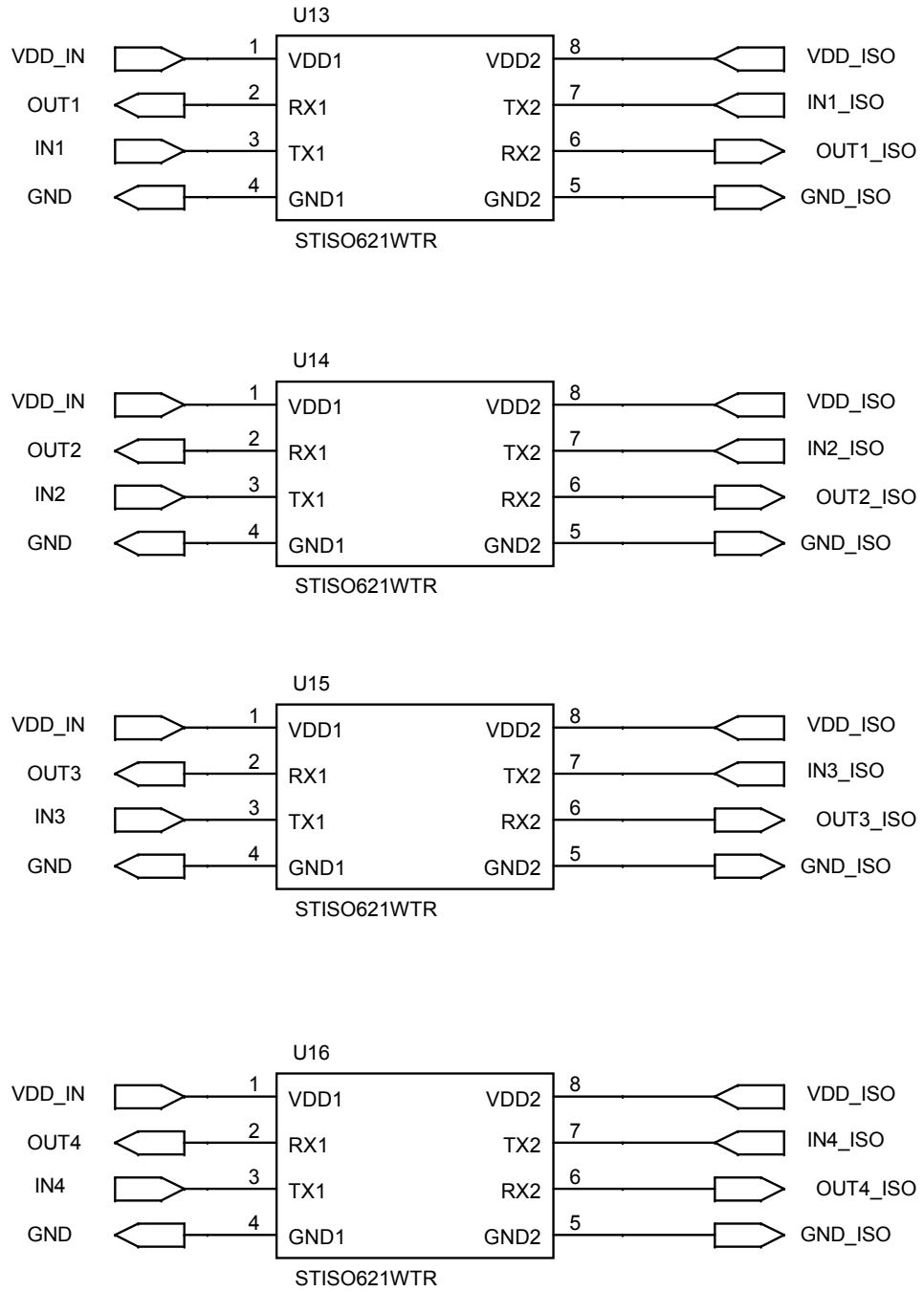


Figure 30. **STEVAL-SILKTB01 circuit schematic (9 of 12)**



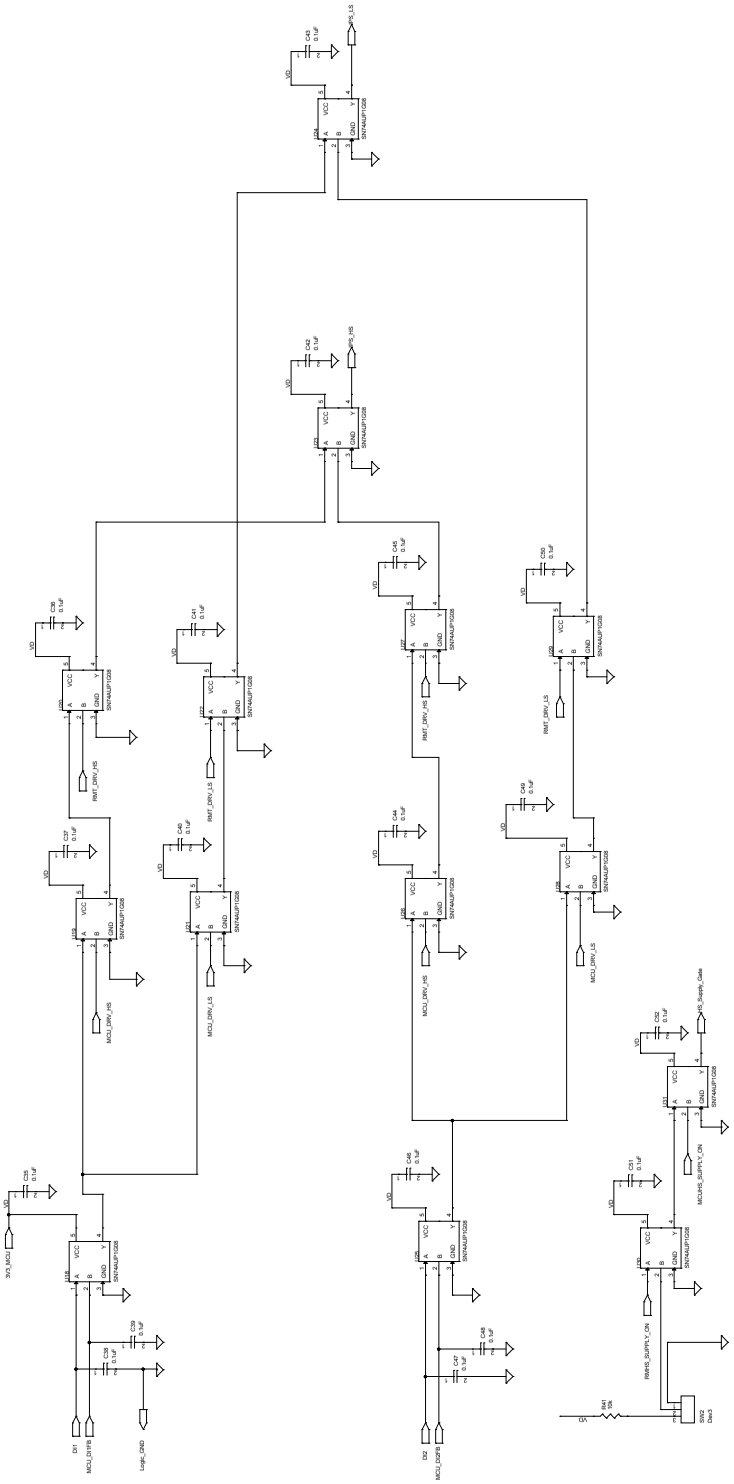


Figure 31. STEVAL-SILKTB01 circuit schematic (10 of 12)

Figure 32. STEVAL-SILKTB01 circuit schematic (11 of 12)

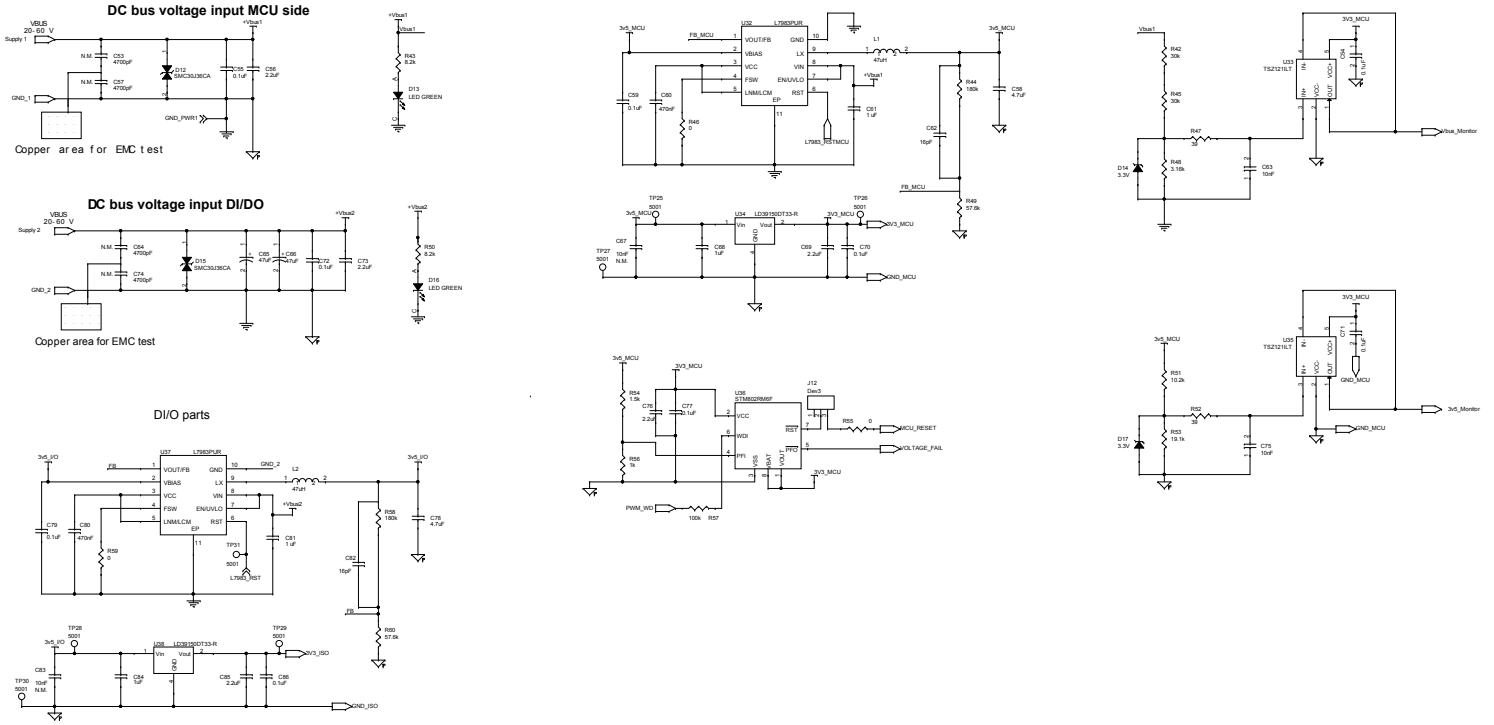
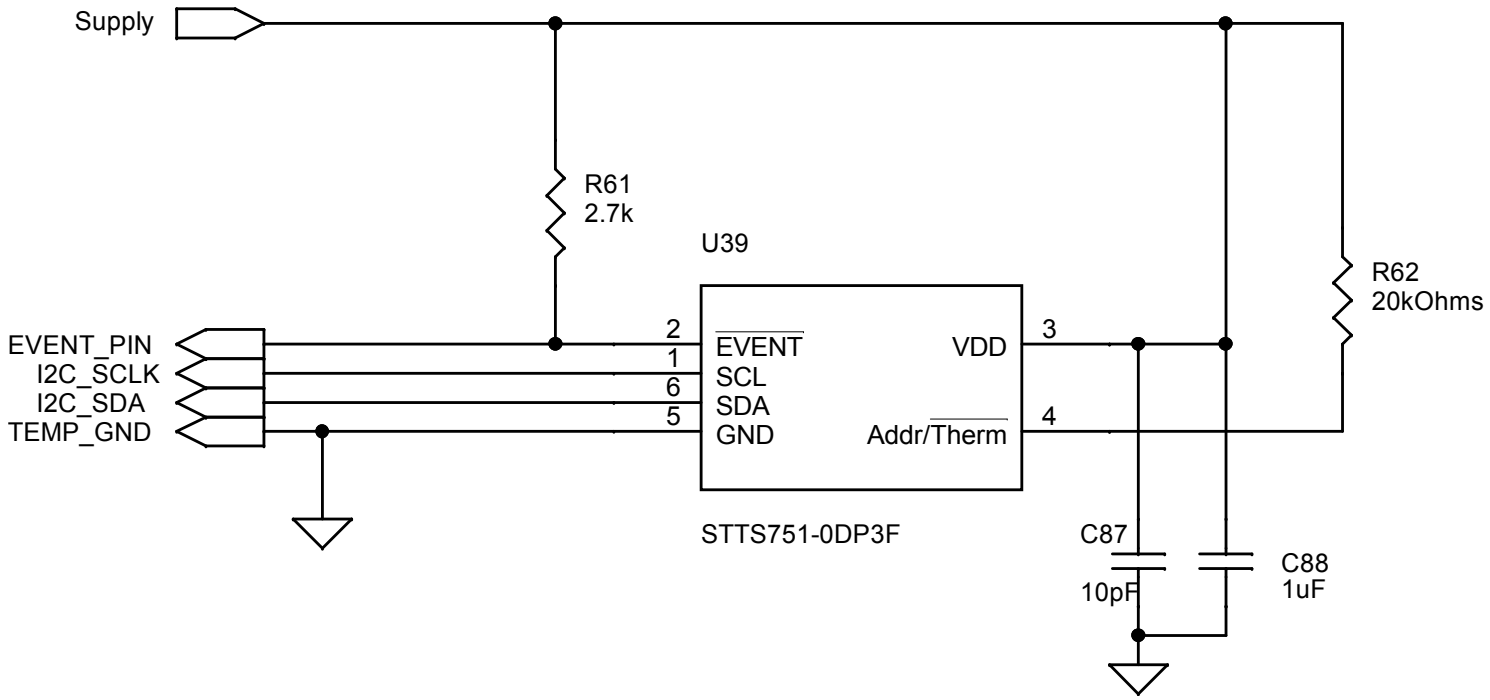


Figure 33. **STEVAL-SILKTB01 circuit schematic (12 of 12)**



3 Kit versions

Table 1. STEVAL-SILKT01 versions

PCB version	Schematic diagrams	Bill of materials
STEVAL$SILKT01A (1)	STEVAL$SILKT01A schematic diagrams	STEVAL$SILKT01A bill of materials

1. *This code identifies the STEVAL-SILKT01 evaluation kit first version. The kit consists of the STEVAL-SILKTA01 main board whose version is identified by the code STEVAL$SILKTA01A and two STEVAL-SILKTB01 actuation boards whose version is identified by the code STEVAL$SILKTB01A.*

Revision history

Table 2. **Document revision history**

Date	Revision	Changes
14-Dec-2023	1	Initial release.

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