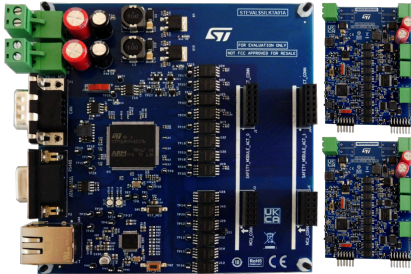


## Evaluation kit for industrial PLC solutions targeting SIL3 applications



### 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.

Product summary	
Evaluation kit for industrial PLC solutions targeting SIL3 applications	<a href="#">STEVAL-SILKT01</a>
Software for <a href="#">STEVAL-SILKT01</a>	<a href="#">STSW-SILKT01</a>
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	<a href="#">STM32H743ZG</a>
Mainstream Arm Cortex-M4 MCU 170 MHz with 128 Kbytes of Flash memory, Math Accelerator, Medium Analog level integration	<a href="#">STM32G431RB</a>
Applications	Programmable Logic Controllers (PLC)

## 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.



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

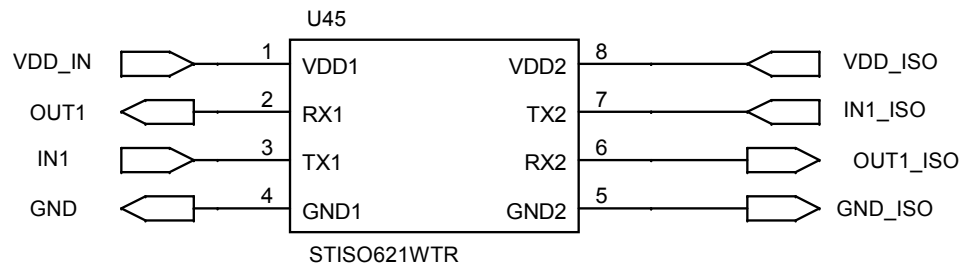


Figure 4. STEVAL-SILKTA01 circuit schematic (4 of 21)

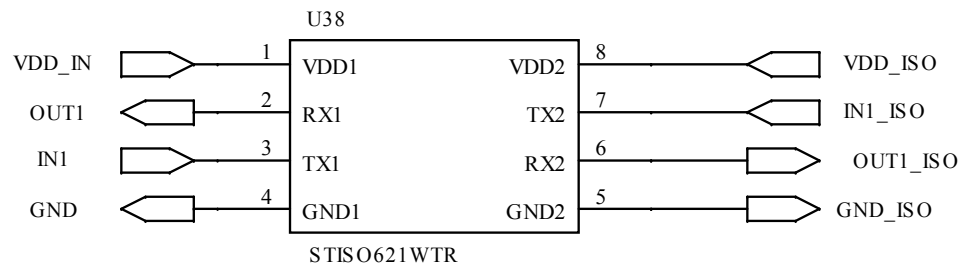


Figure 5. STEVAL-SILKTA01 circuit schematic (5 of 21)

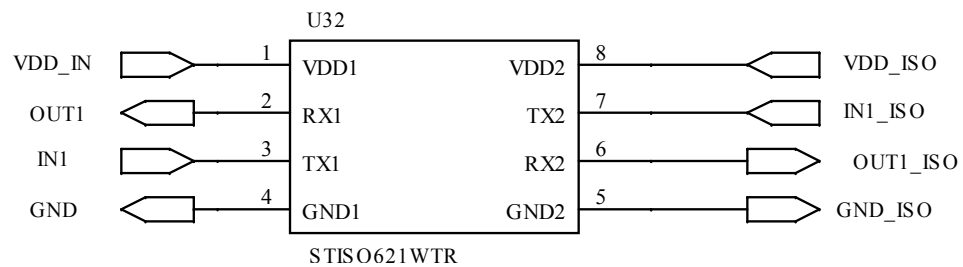


Figure 6. STEVAL-SILKTA01 circuit schematic (6 of 21)

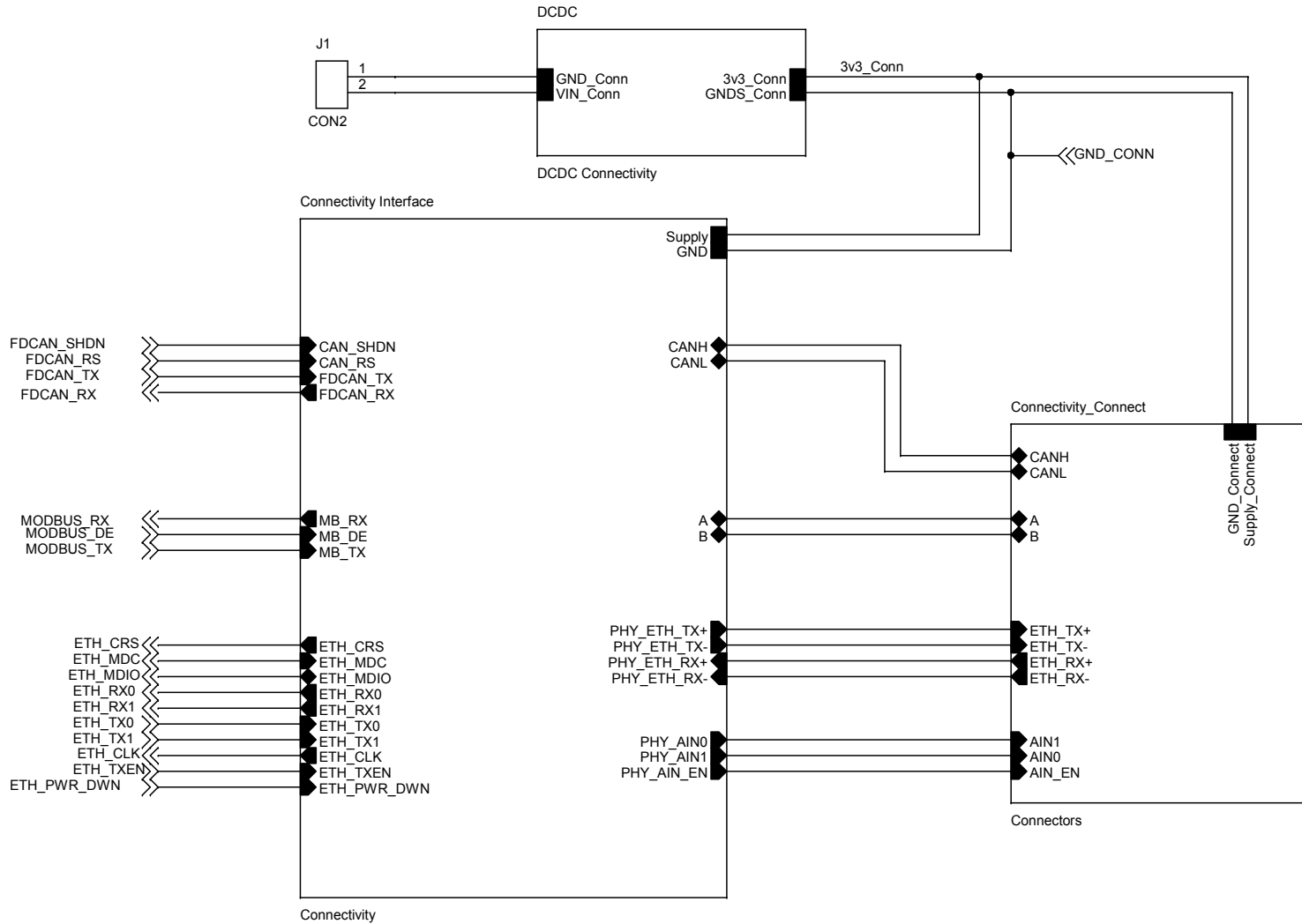
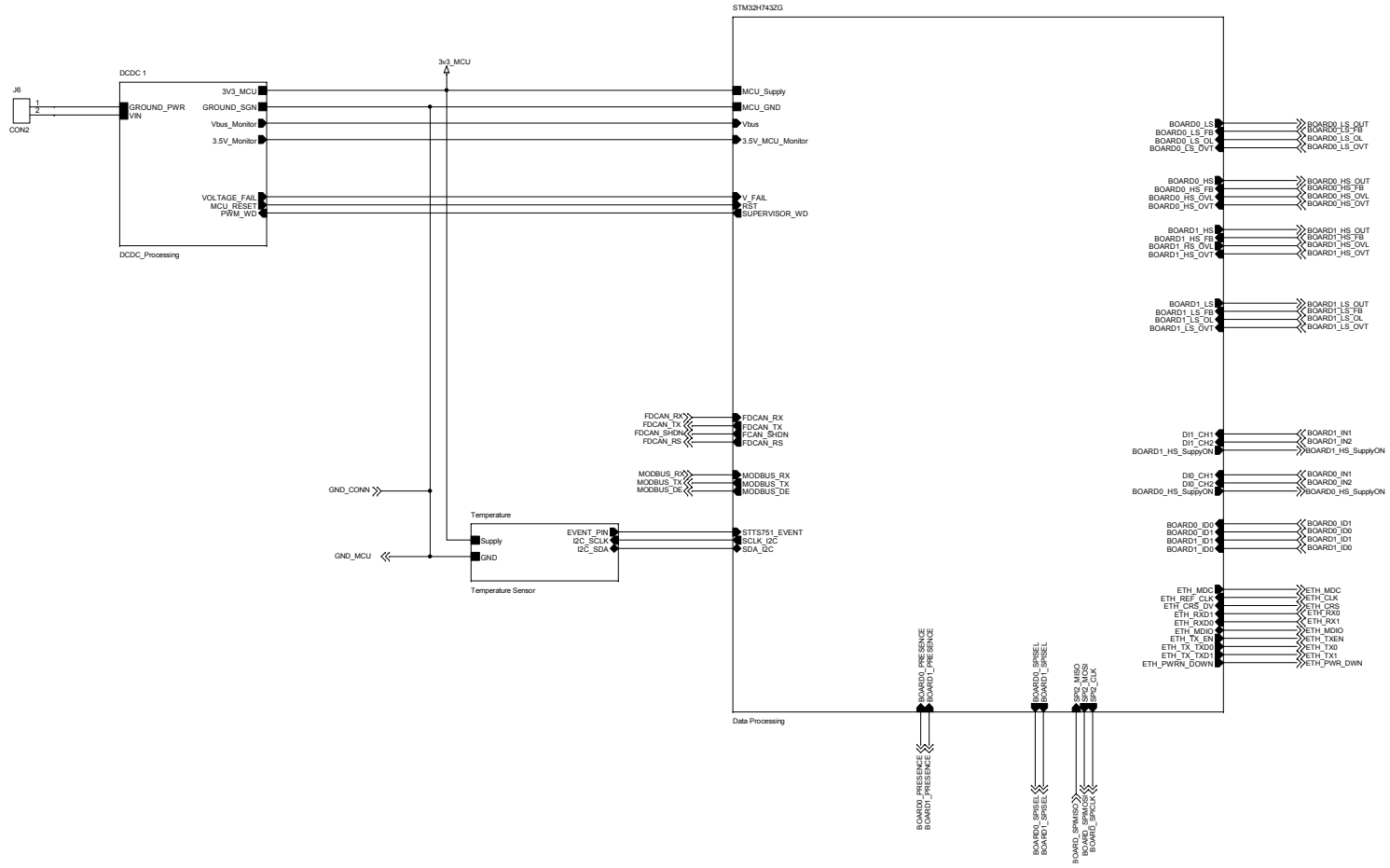




Figure 8. STEVAL-SILKTA01 circuit schematic (8 of 21)



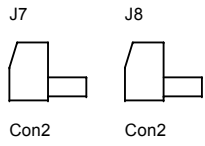


Figure 9. STEVAL-SILKTA01 circuit schematic (9 of 21)

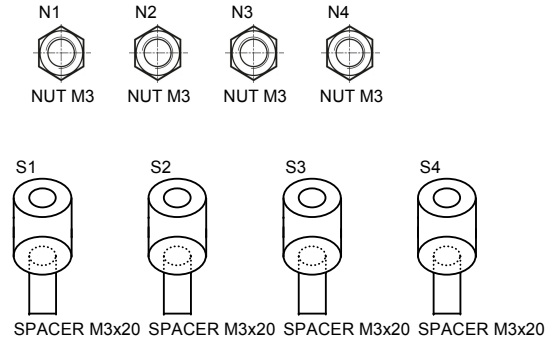






Figure 11. STEVAL-SILKTA01 circuit schematic (11 of 21)

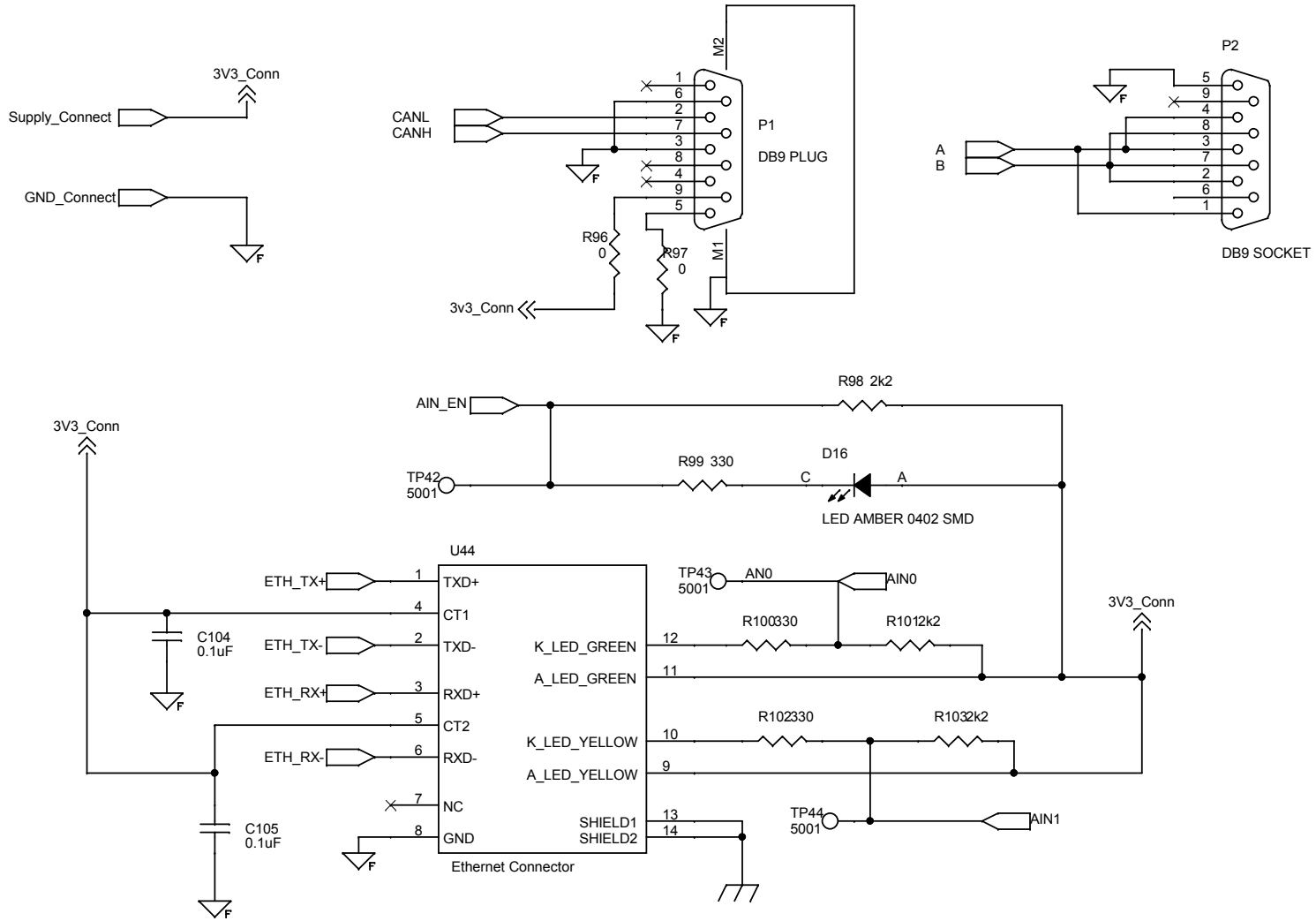




Figure 13. STEVAL-SILKTA01 circuit schematic (13 of 21)

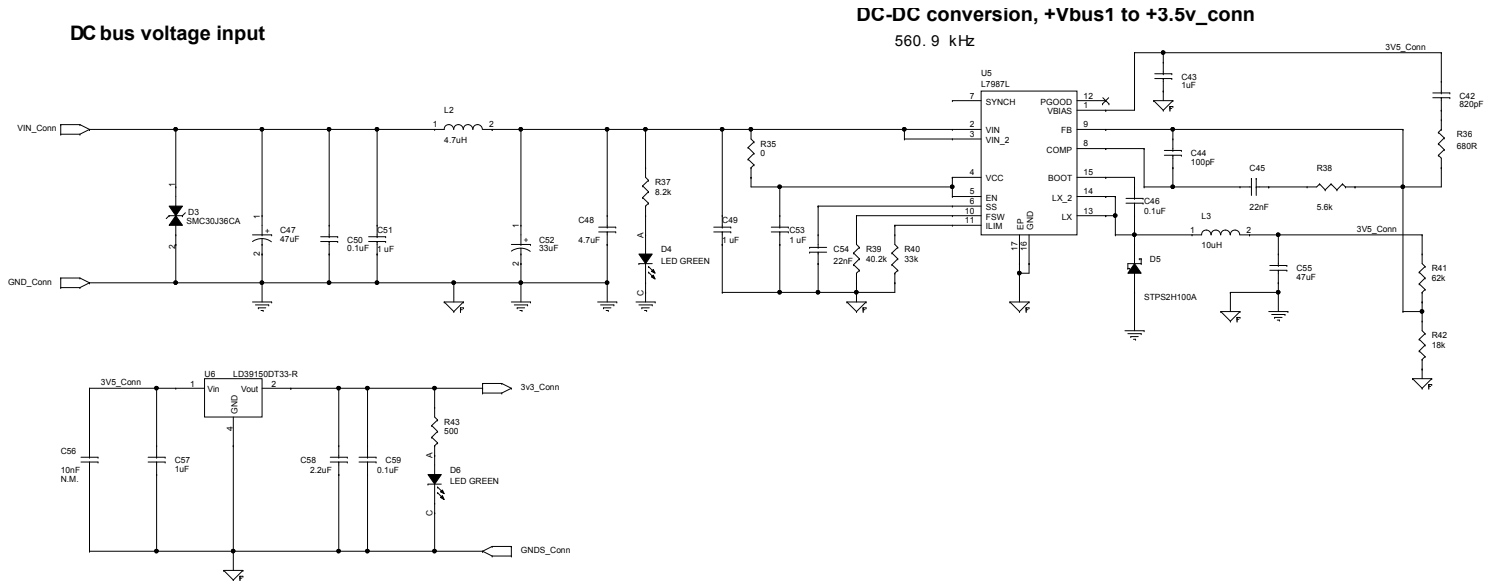


Figure 14. STEVAL-SILKTA01 circuit schematic (14 of 21)

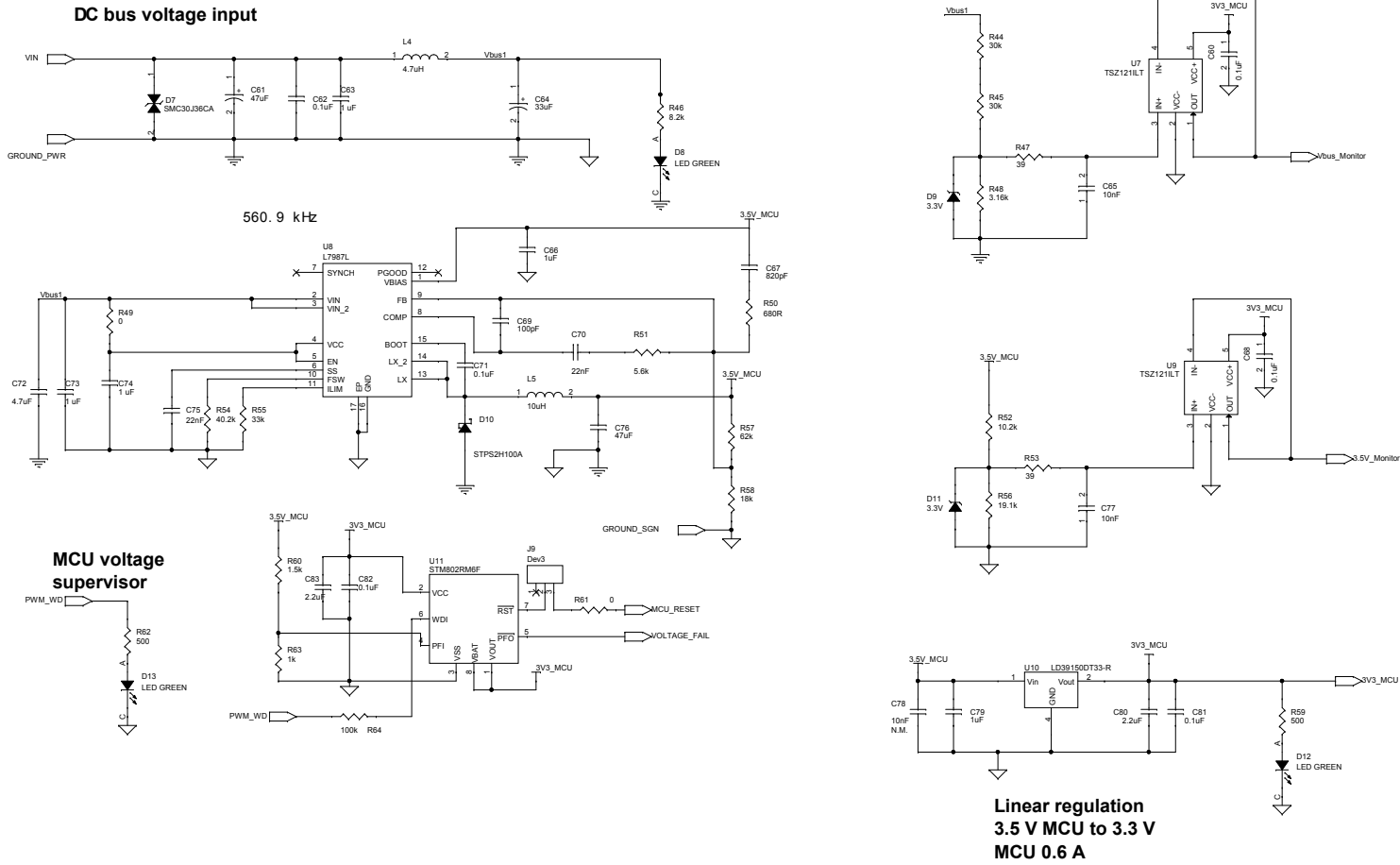


Figure 15. STEVAL-SILKTA01 circuit schematic (15 of 21)

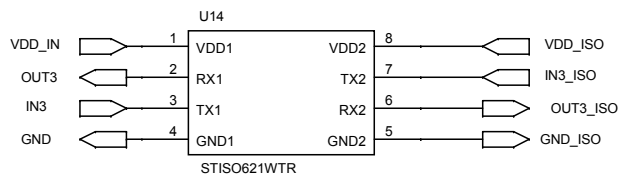
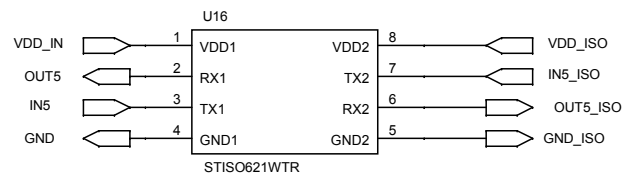
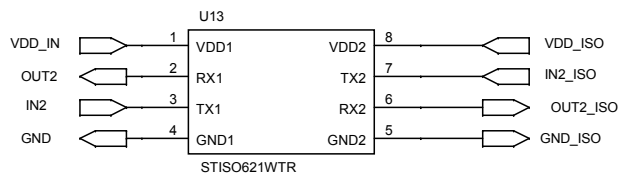
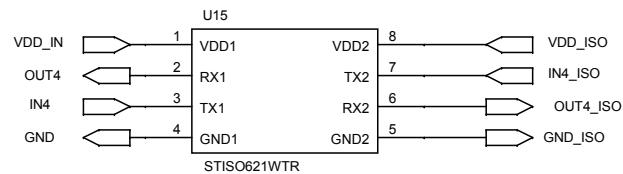
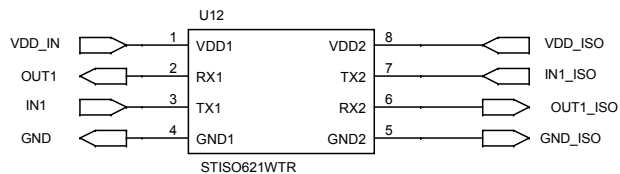


Figure 16. STEVAL-SILKTA01 circuit schematic (16 of 21)

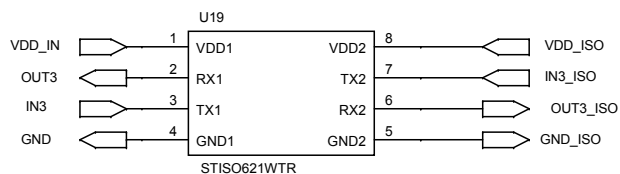
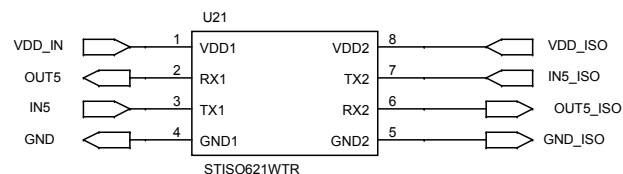
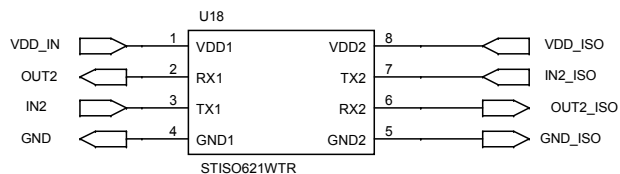
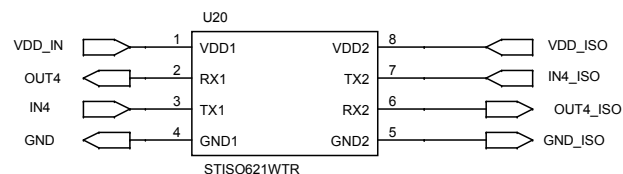
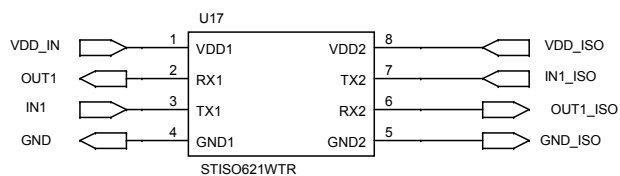


Figure 17. STEVAL-SILKTA01 circuit schematic (17 of 21)

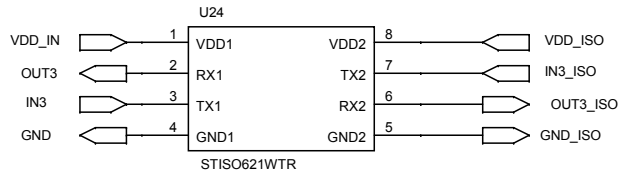
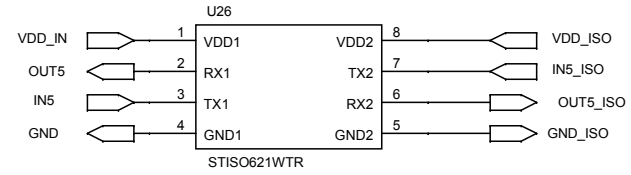
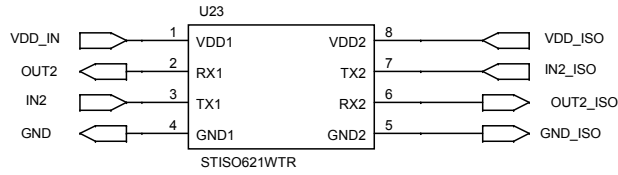
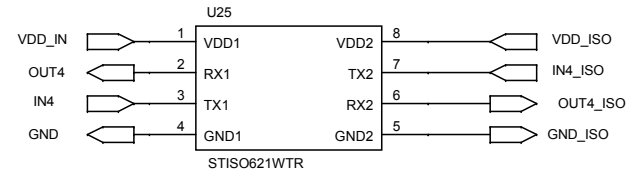
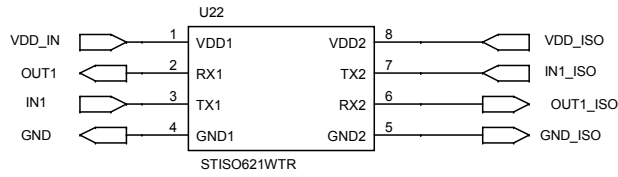


Figure 18. STEVAL-SILKTA01 circuit schematic (18 of 21)

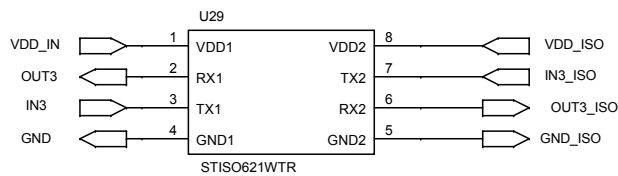
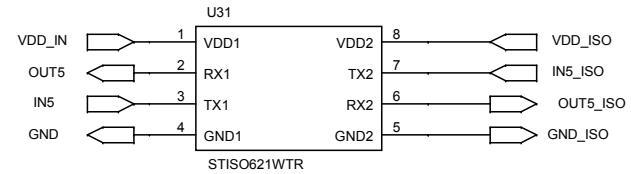
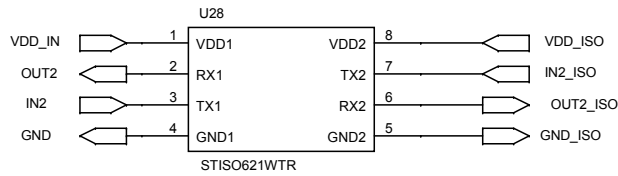
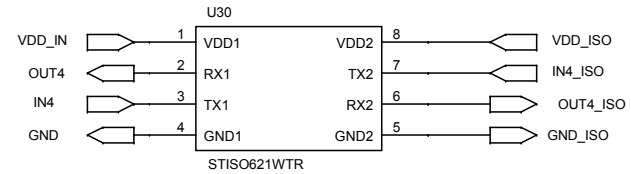
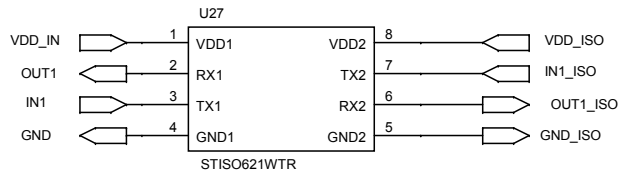


Figure 19. STEVAL-SILKTA01 circuit schematic (19 of 21)

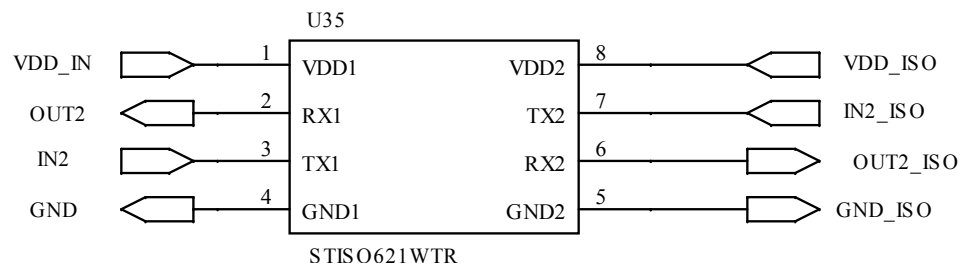
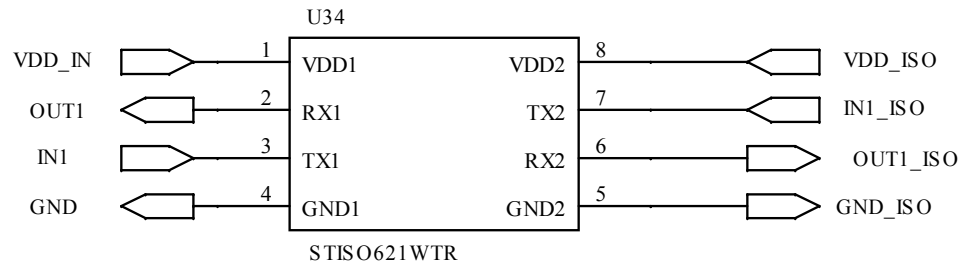


Figure 20. STEVAL-SILKTA01 circuit schematic (20 of 21)

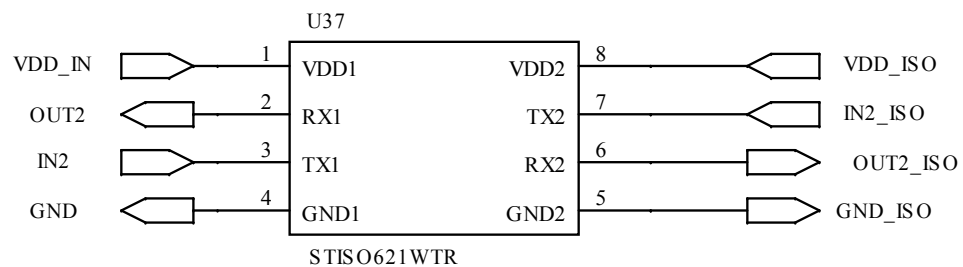
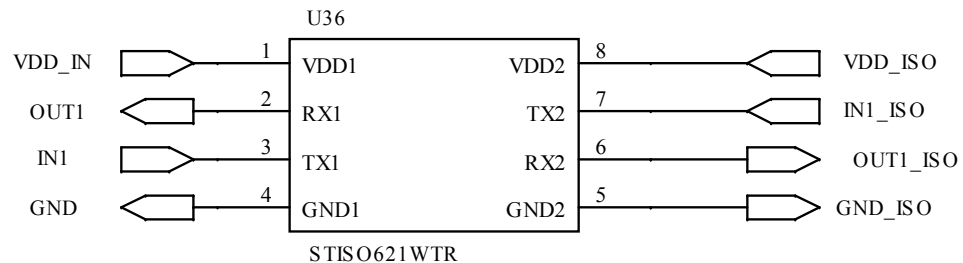




Figure 21. STEVAL-SILKTA01 circuit schematic (21 of 21)

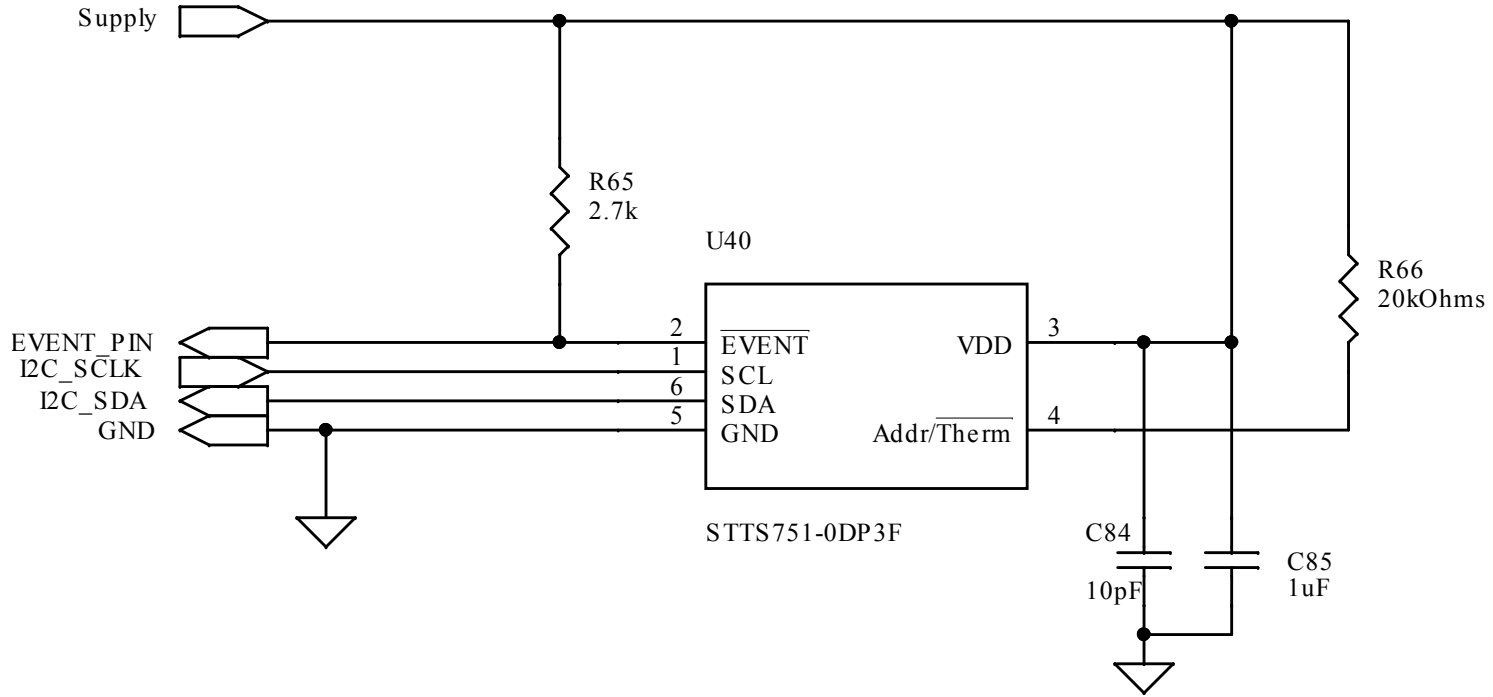


Figure 22. STEVAL-SILKTB01 circuit schematic (1 of 12)

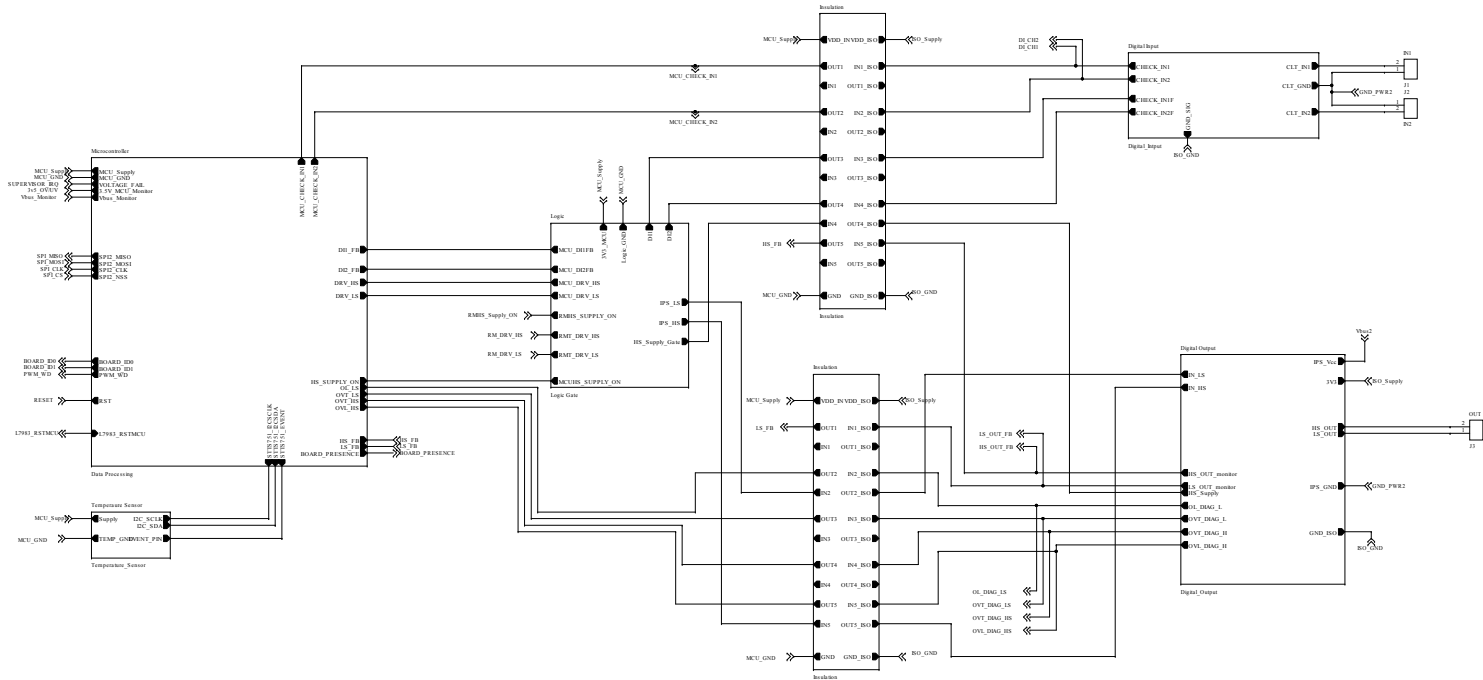


Figure 23. STEVAL-SILKTB01 circuit schematic (2 of 12)

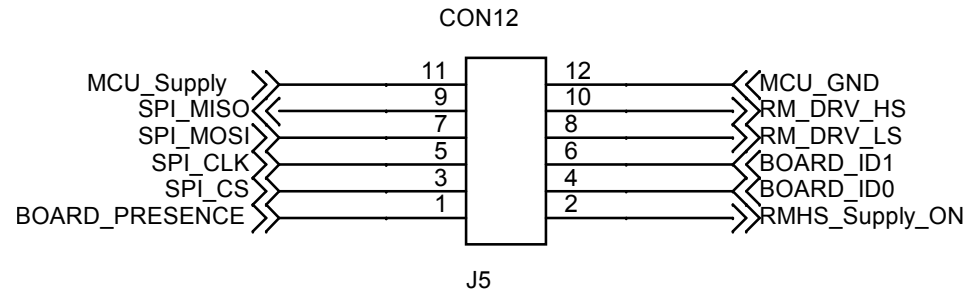
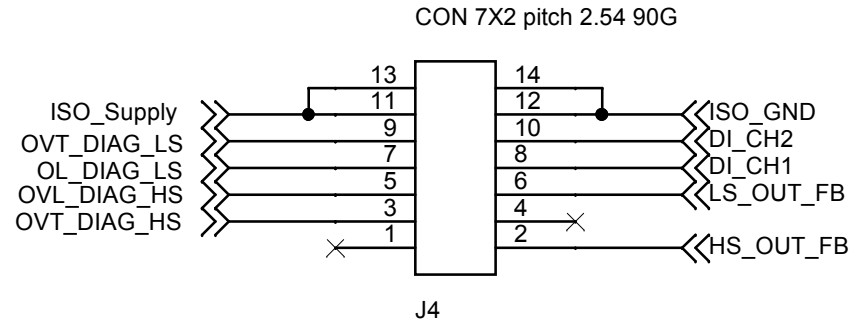


Figure 24. STEVAL-SILKTB01 circuit schematic (3 of 12)

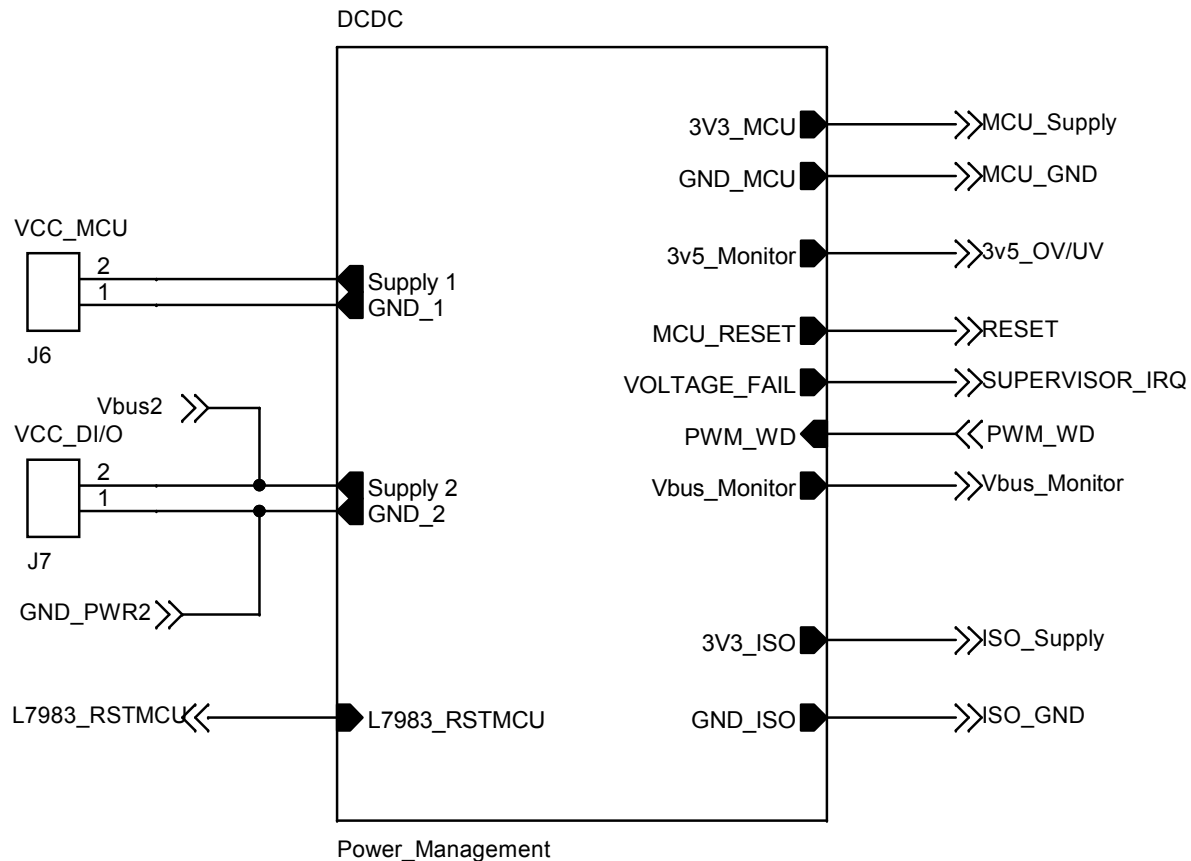


Figure 25. STEVAL-SILKTB01 circuit schematic (4 of 12)

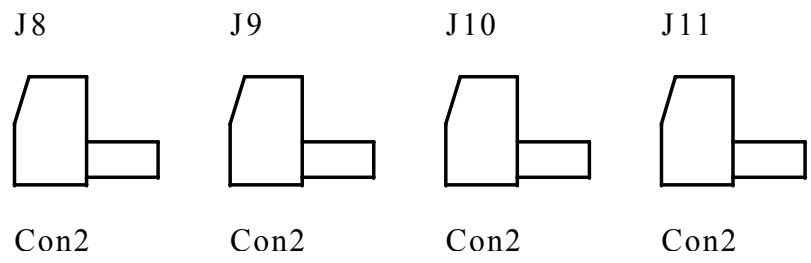


Figure 26. STEVAL-SILKTB01 circuit schematic (5 of 12)

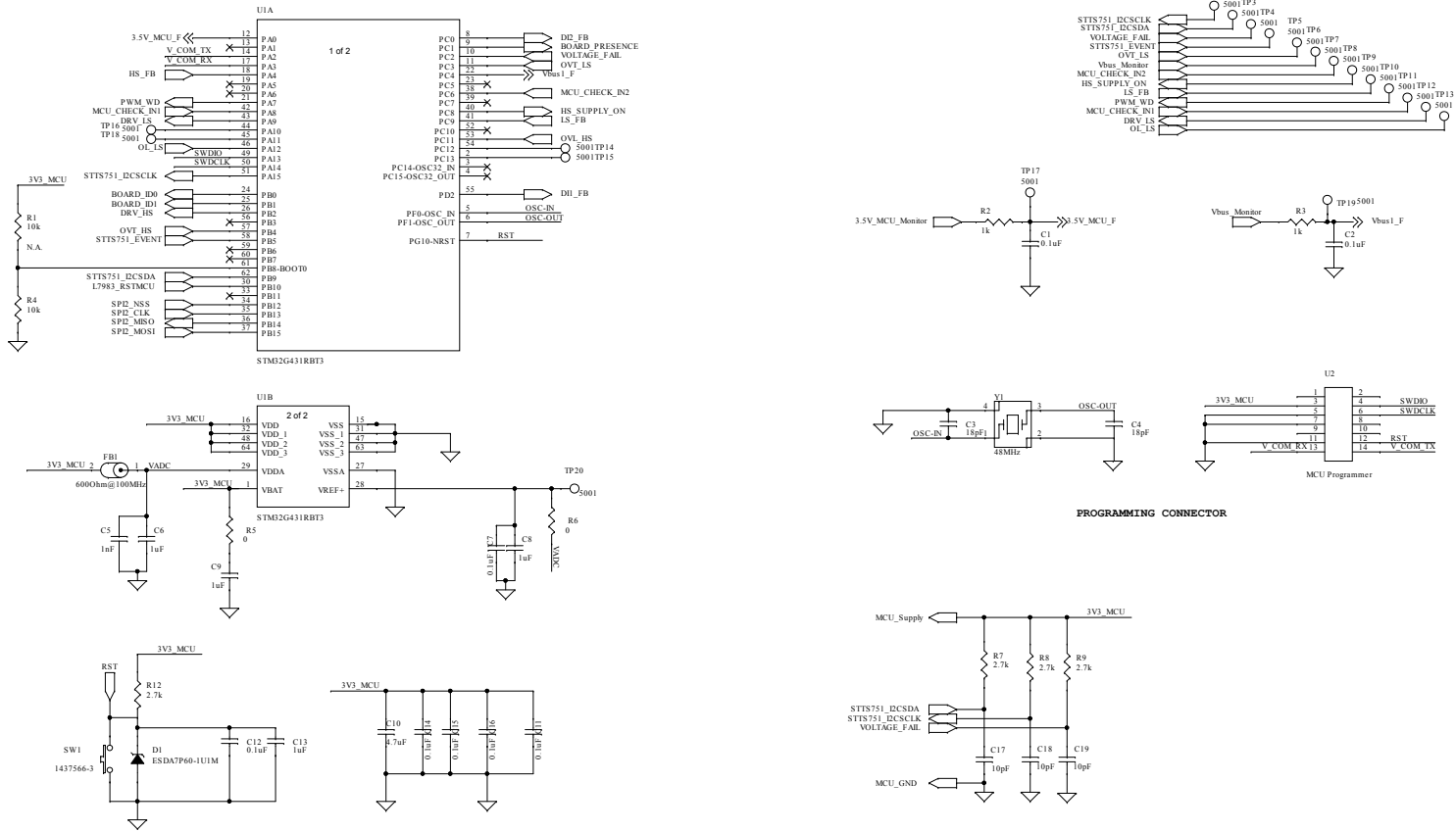


Figure 27. STEVAL-SILKTB01 circuit schematic (6 of 12)

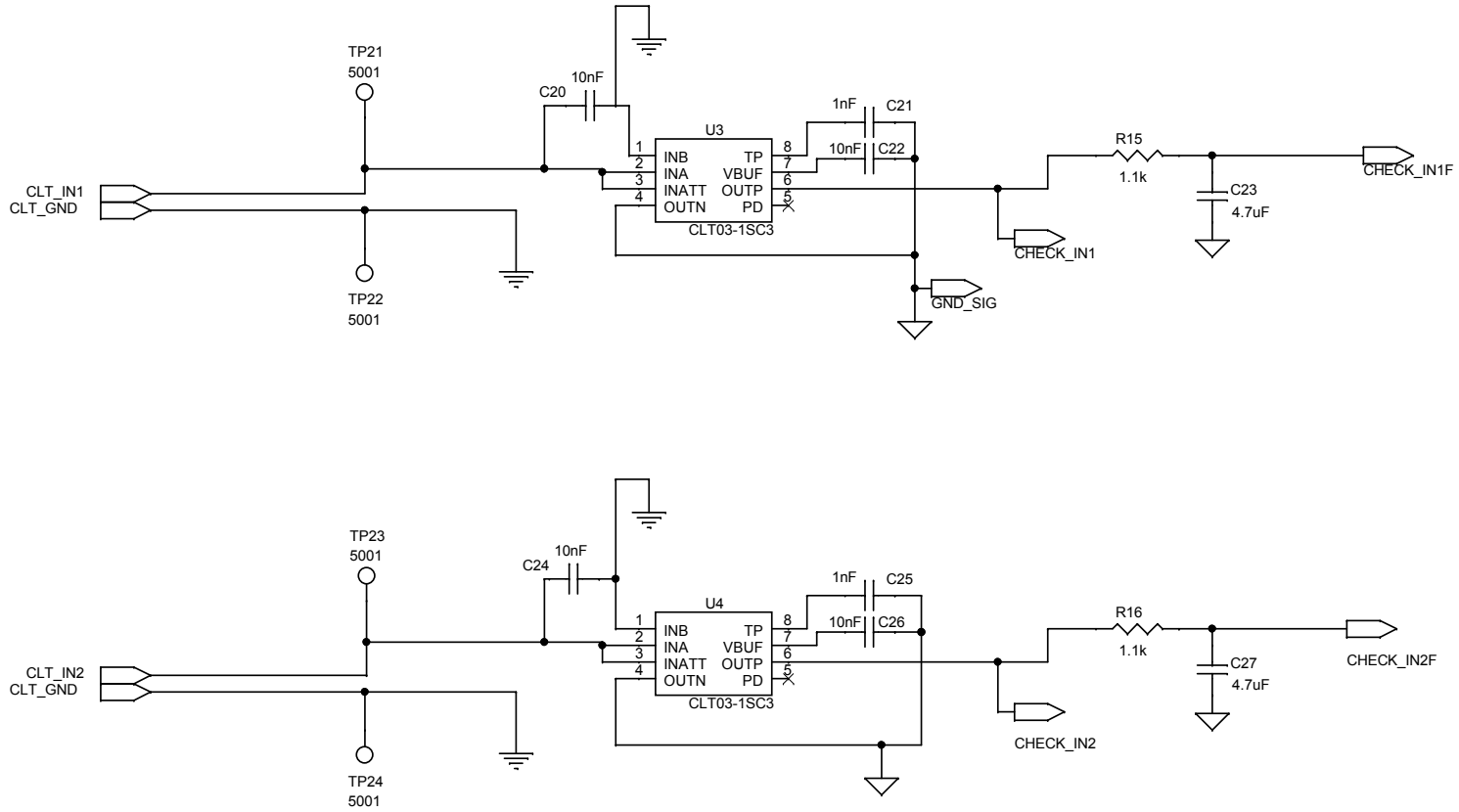


Figure 28. STEVAL-SILKTB01 circuit schematic (7 of 12)

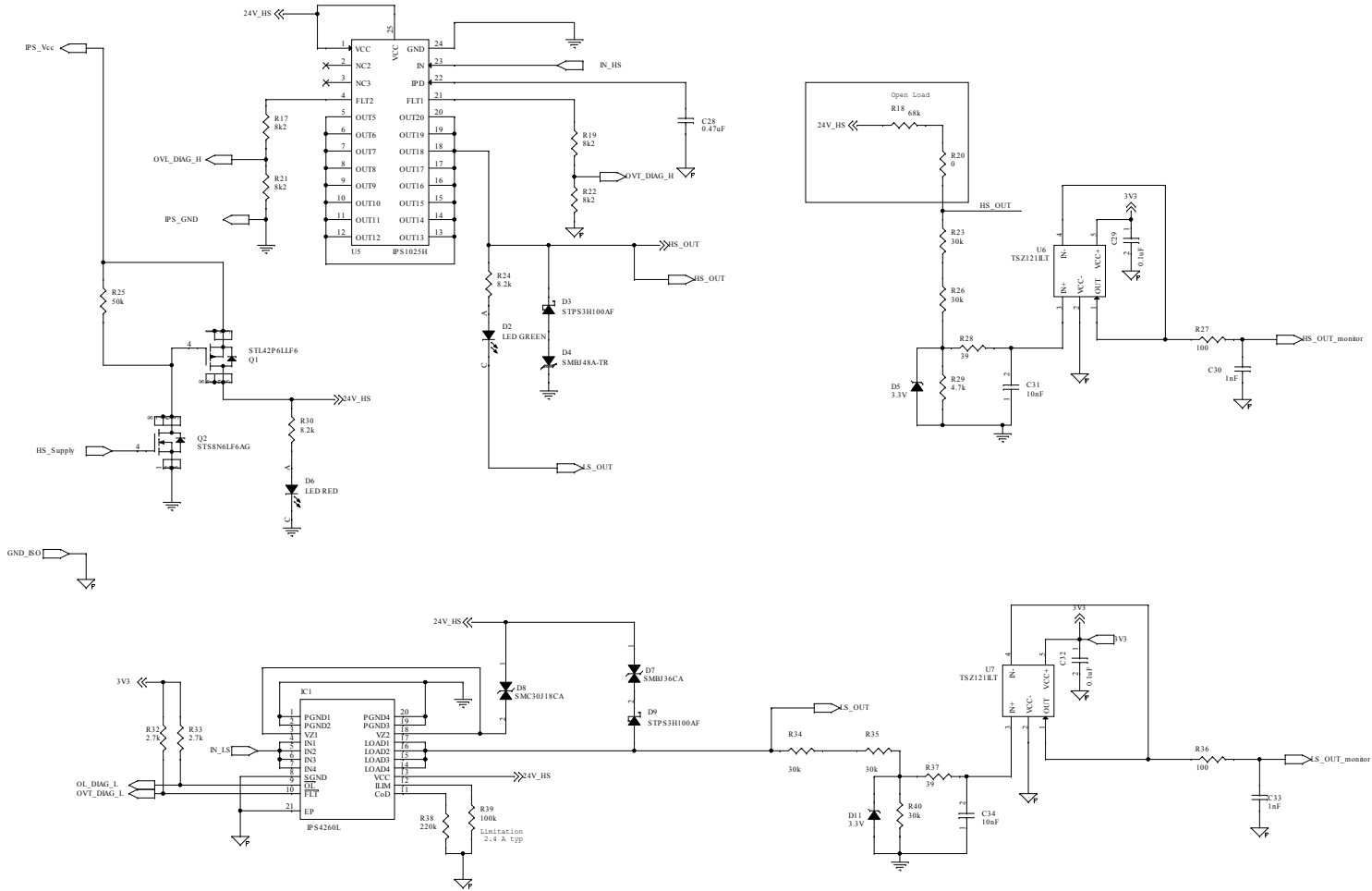


Figure 29. STEVAL-SILKTB01 circuit schematic (8 of 12)

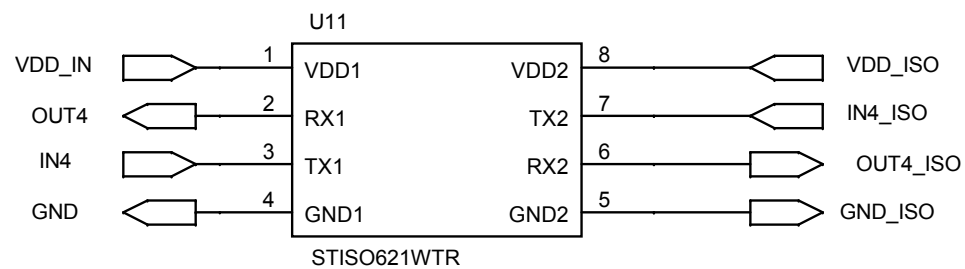
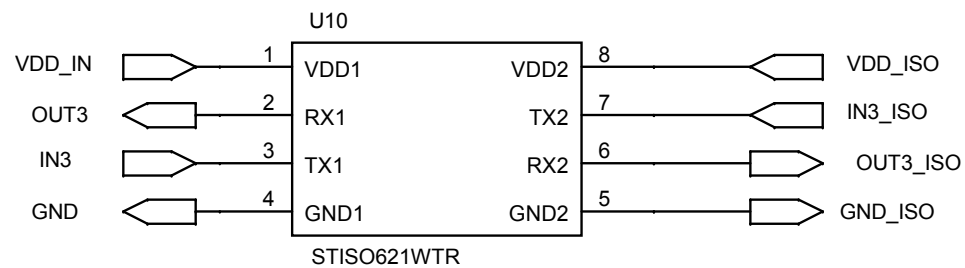
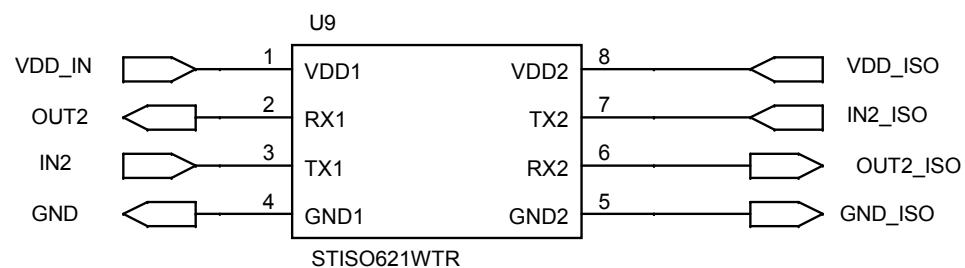
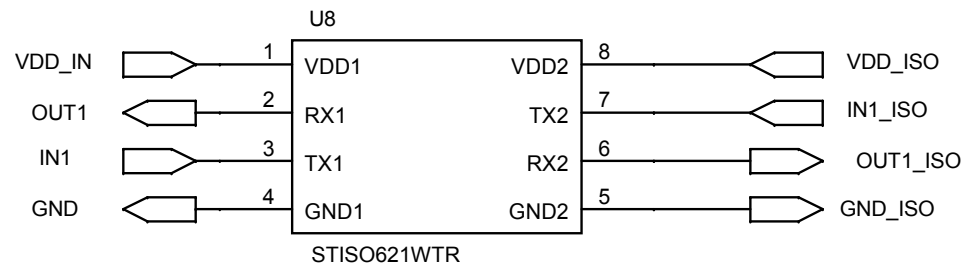
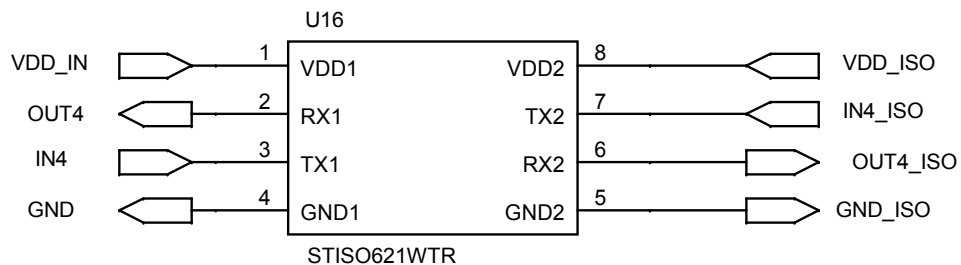
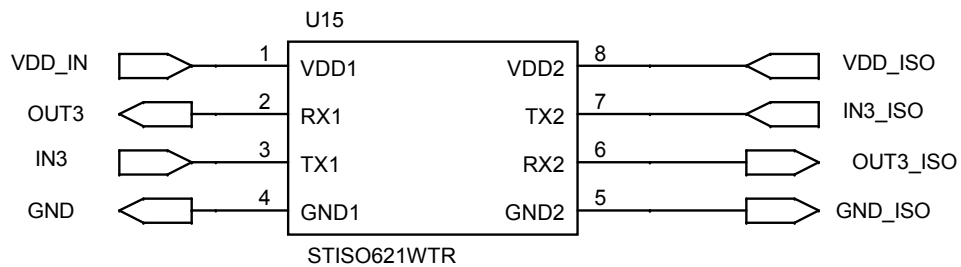
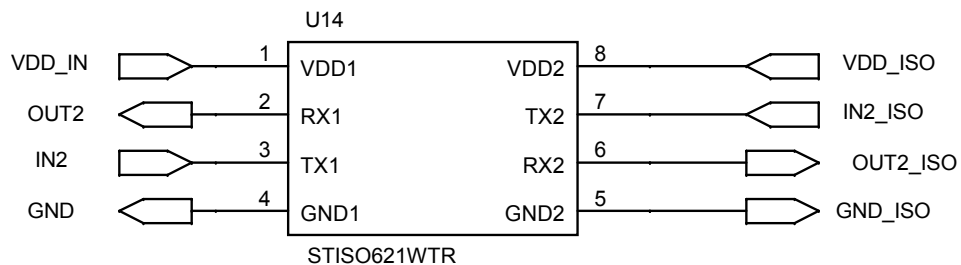
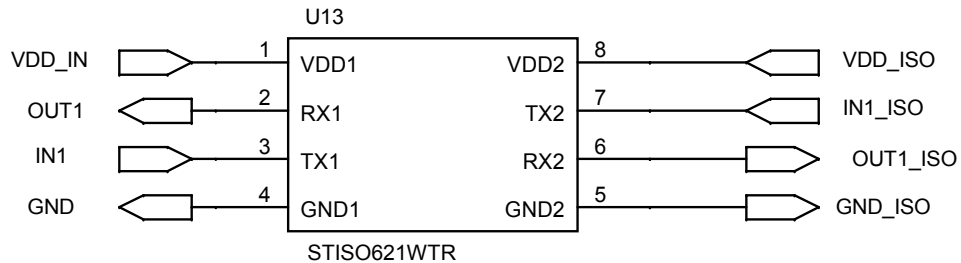




Figure 30. STEVAL-SILKTB01 circuit schematic (9 of 12)



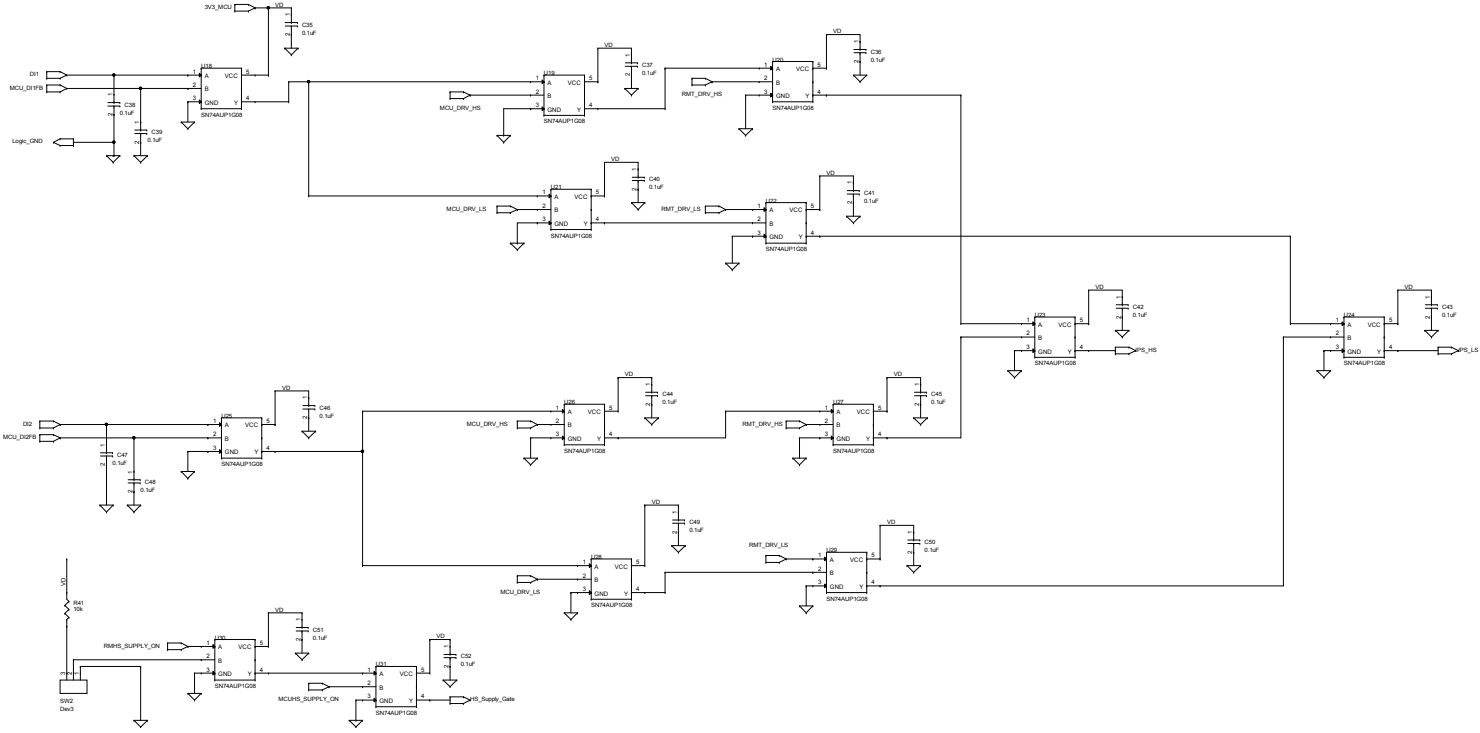


Figure 31. STEVAL-SILKT01 circuit schematic (10 of 12)



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

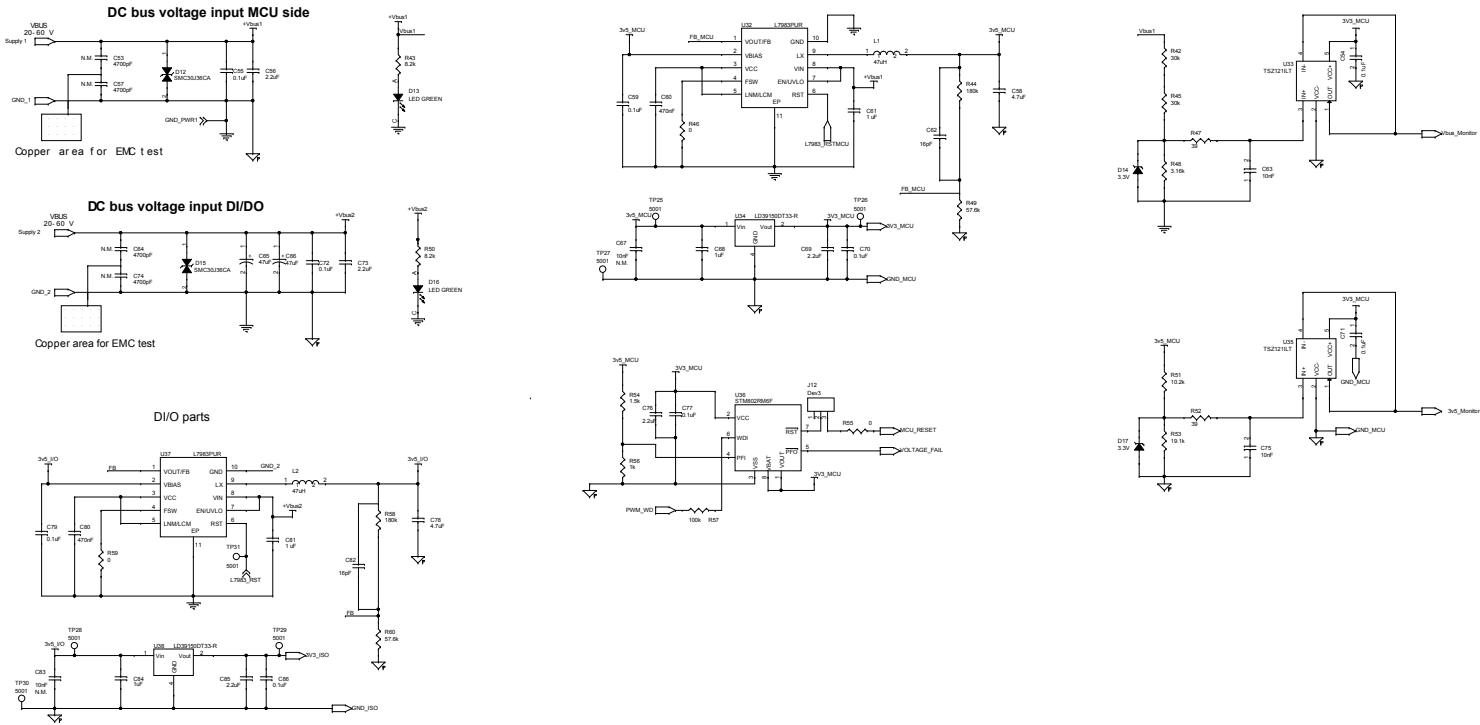
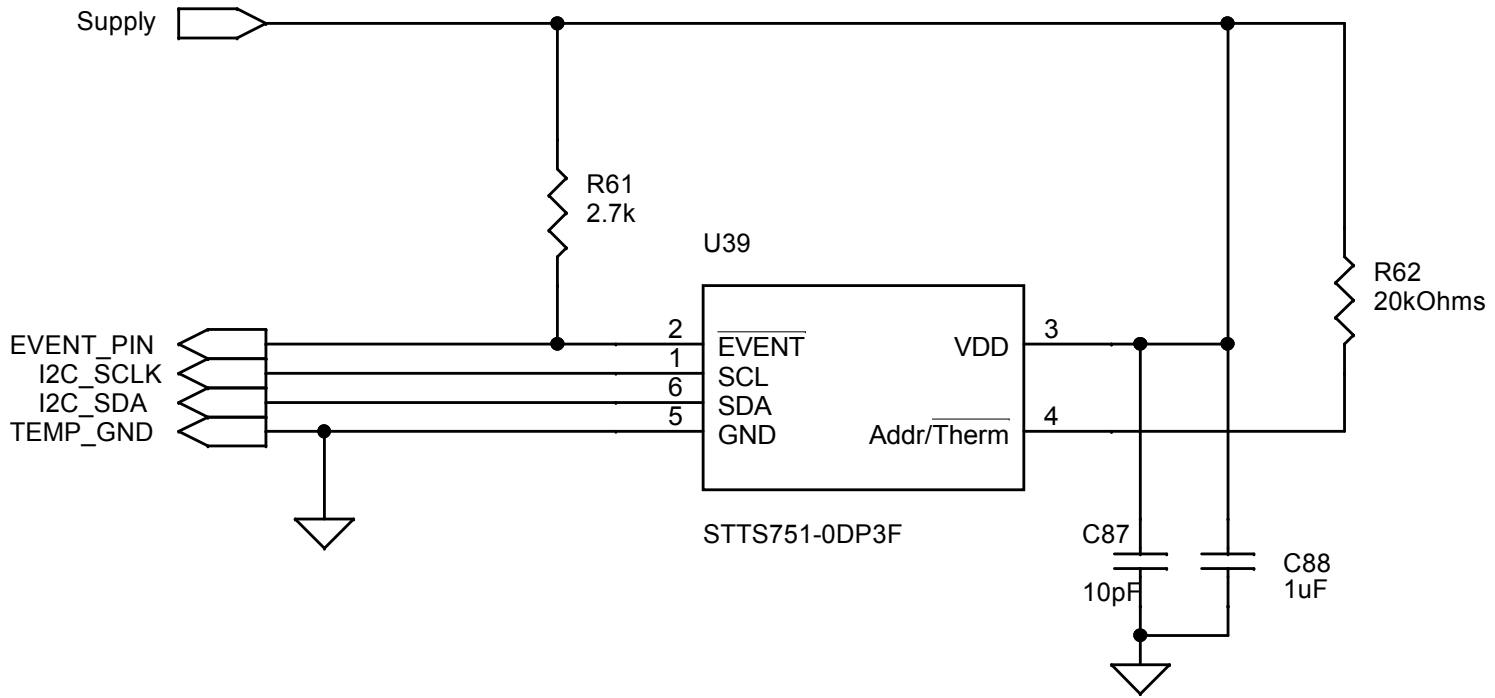


Figure 33. STEVAL-SILKTB01 circuit schematic (12 of 12)



### 3 Kit versions

**Table 1. STEVAL-SILKT01 versions**

PCB version	Schematic diagrams	Bill of materials
STEVAL\$SILKT01B <sup>(1)</sup>	STEVAL\$SILKT01B schematic diagrams	STEVAL\$SILKT01B bill of materials

- This code identifies the STEVAL-SILKT01 evaluation kit second 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\$SILKTB01B.*

## Revision history

**Table 2. Document revision history**

Date	Revision	Changes
14-Dec-2023	1	Initial release.
26-Jun-2024	2	Updated <i>Figure 28. STEVAL-SILKTB01 circuit schematic (7 of 12)</i>
14-Nov-2024	3	Updated cover image, <a href="#">Section 2: Schematic diagrams</a> and <a href="#">Section 3: Kit versions</a> .

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