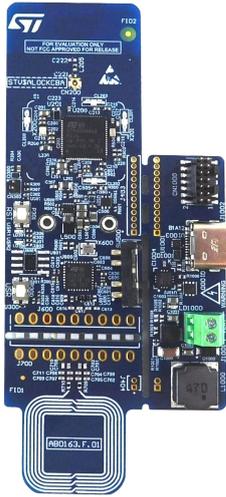


ALIRO access control reference design based on STM32WBA65RI, ST25R300 and STSAFE-A120



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

Features

- Small form factor reference design for smart lock with: integrated printed antennas for 2.4 GHz Bluetooth® LE connectivity and 13.56 MHz NFC communication
- Ultra-low power wireless STM32WBA65RI series microcontroller based on the Arm® Cortex® M33 core featuring:
 - 2 Mbytes of flash memory and 512 Kbytes of SRAM
 - 2.4 GHz RF transceiver supporting Bluetooth® LE and IEEE 802.15.4
 - Security and cryptography
- On-board STSAFE-A120, secure element customized with a standard evaluation profile
- ST25R300, high-performance NFC universal device supporting: NFC initiator, NFC target, NFC reader, and NFC card emulation modes
- Optimized power management for ultra-low power performance based on ST1PS03
- Multiple power supply options:
 - Battery 3×AAA voltage (3.6-4.5 V)
 - USB type-C (5V)
 - External power supply (5-48 V)
- Additional features:
 - USB Type-C® interface
 - JTAG/SWD interface
 - 34pin expansion connector

Description

STEVAL-ALOCKCB integrated solution is engineered for the physical access control market. It enables the development of secure and connected smart access devices tailored for residential, industrial, and commercial environments.

The design targets to minimize system complexity, enhance interoperability, and accelerate time-to-market for developers and OEMs.

A key component of the solution is the Aliro protocol support. Aliro aims to standardize communication between access readers and user devices, ensuring secure credential exchange, privacy-preserving interactions, and future-proof interoperability across ecosystems.

As part of its specification, Aliro defines both the credential exchange format and the transport protocols used to deliver them, including NFC, Bluetooth® LE, and UWB.

This multiprotocol approach enables flexible access, including tap-to-enter with NFC and hands-free entry using Bluetooth® LE or UWB, while ensuring consistent and secure communication across devices and platforms.

At the core of the solution is the STM32WBA65RI microcontroller, a high-performance, ultra-low power device based on the Arm Cortex®-M33 core running at up to 100 MHz. It integrates a complete Bluetooth® LE 6.0 stack, making it ideal for secure wireless communication in access control applications.

| Product summary | |
|---|-------------------|
| ALIRO access control reference design based on STM32WBA65RI, ST25R300 and STSAFE-A120 | STEVAL-ALOCKCB |
| Ultra-low power, Arm Cortex-M33 TZ MCU 100 MHz with 2 Mbytes of Flash memory, Bluetooth LE 6.0, 802.15.4, Zigbee, Thread and Matter | STM32WBA65RIV6 |
| High-end NFC reader for payment, access control, NFC charging and consumer applications | ST25R300-AQET |
| Secure authentication companion device for consumables, accessories, and connected objects | STSAFEA120S8SPL05 |

| Product summary | |
|-----------------|---|
| Applications | Smart home Smart lock and access Security solutions |

The [STM32WBA65RI](#) also includes two hardware cryptographic accelerators that supports AES-128/256 including one with DPA, public key accelerator (PKA) with DPA resistance, SHA-256, SHA1, and true random number generator (TRNG). These features allow the device to efficiently implement secure authentication protocols, encrypted communication, and key exchange mechanisms required for modern access control systems.

The hardware-based security offloads cryptographic operations from the CPU, reducing latency and power consumption while ensuring compliance with industry-grade security standards.

NFC technology enables proximity-based authentication, allowing users to access doors and devices with a simple tap. The solution leverages the [ST25R300](#) NFC reader, which supports ISO/IEC 14443 type A/B including higher bit rates, NFC-F (FeliCa™), NFC-V (ISO15693) up to 212 kbps, and NFC-A/NFC-F card emulation. It offers reliable tag detection with dynamic power output and low-power wake-up modes, making it well suited for battery-operated access control systems.

To further enhance security, the [STEVAL-ALOCKCB](#) integrates the [STSAFE-A120](#) secure element, which provides robust key management and secure provisioning capabilities. [STSAFE-A120](#) ensures that cryptographic keys are stored and handled in a tamper-resistant environment, enabling trusted identity verification and secure credential life cycle management throughout the device's operational life.

Optionally, the [STEVAL-ALOCKCB](#) can integrate Matter over Thread to enable with broader smart home platforms. This allows developers to extend access control functionality into unified smart home environments while maintaining robust security and performance.

To support modularity and hardware scalability, the [STEVAL-ALOCKCB](#) includes an expansion connector interface that allows seamless integration of additional I/O controller or communication modules. This connector enables developers to extend functionality—such as adding to door actuation systems, biometric sensors, external secure features like keypad, or additional connectivity options like ultra-wideband (UWB)—without redesigning the core hardware.

1 Schematic diagrams

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

Figure 1. STEVAL-ALOCKCB circuit schematic (1 of 10)

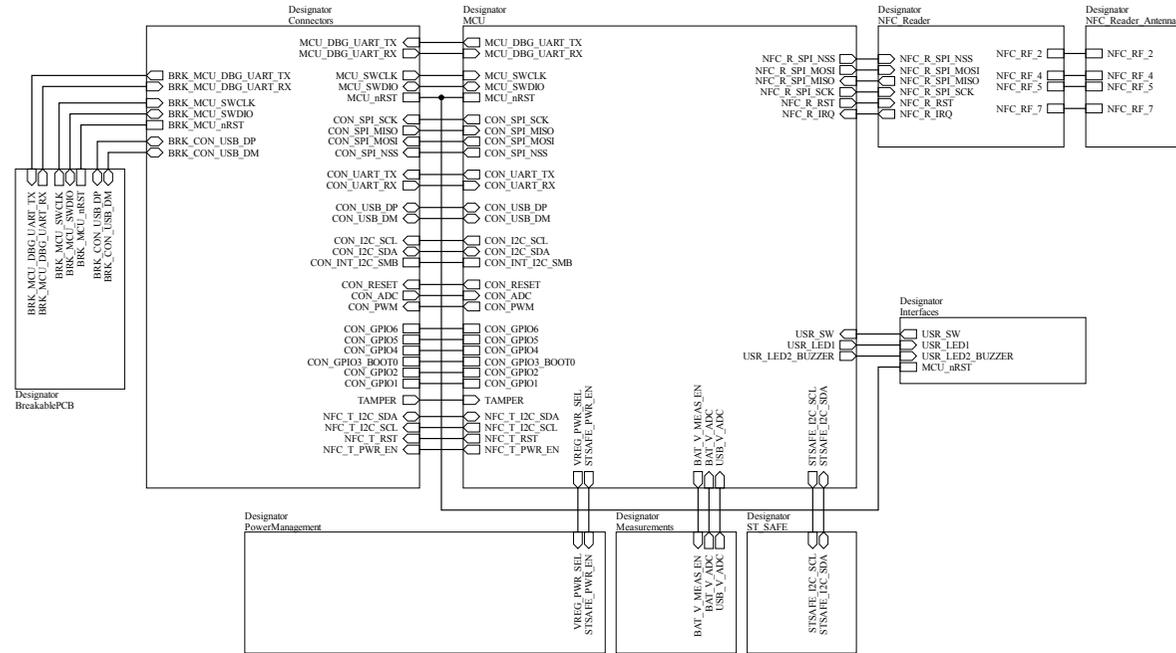


Figure 2. STEVAL-ALOCKCB circuit schematic (2 of 10)

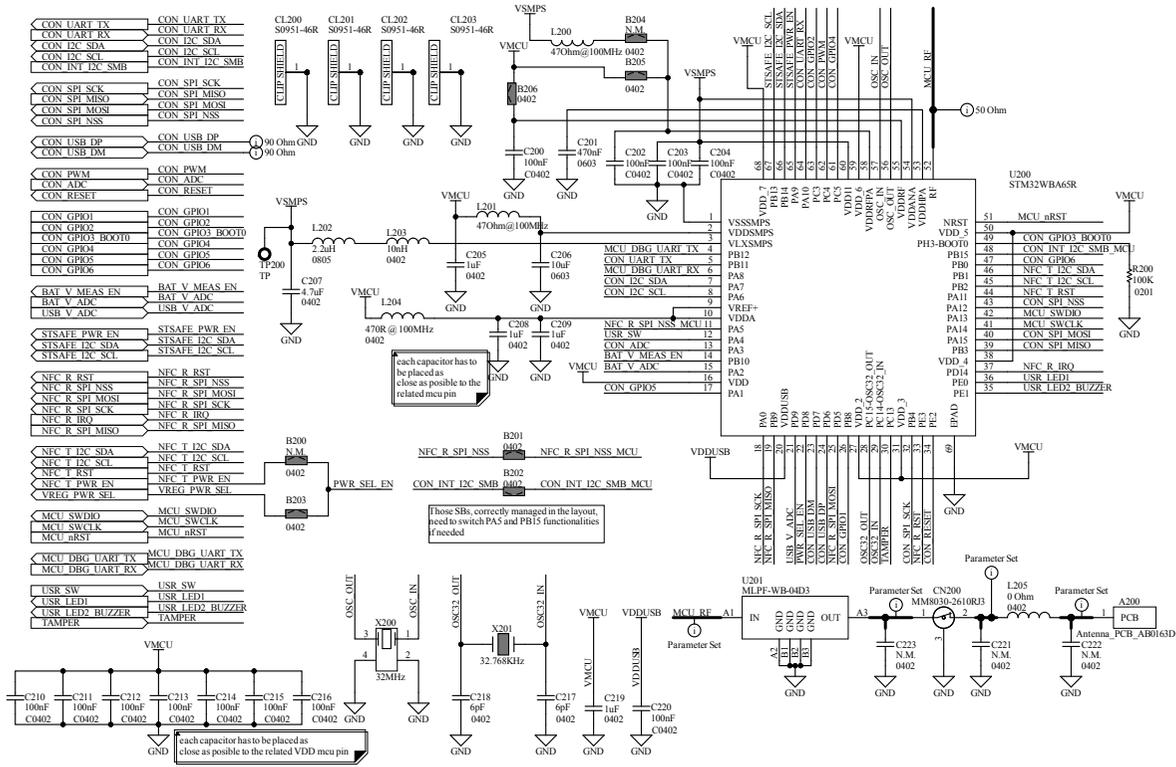


Figure 3. STEVAL-ALOCKCB circuit schematic (3 of 10)

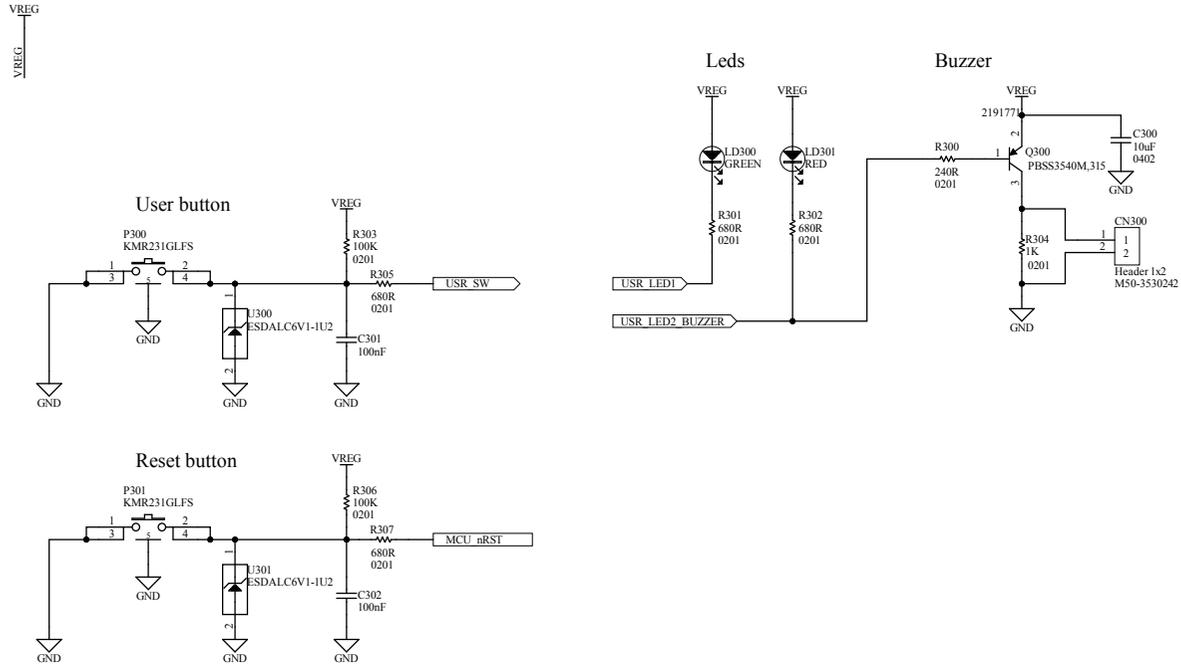
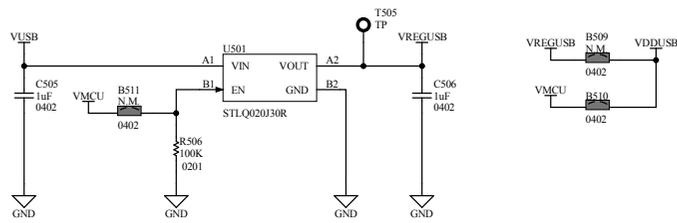
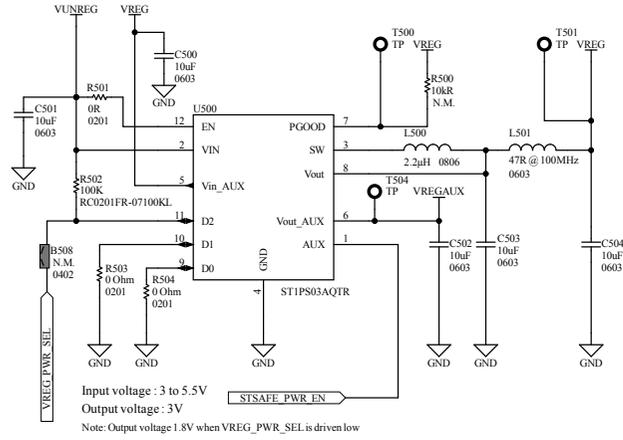


Figure 5. STEVAL-ALOCKCB circuit schematic (5 of 10)



Power supply selector

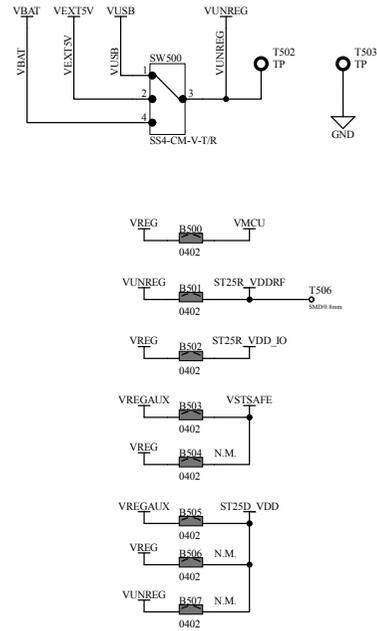


Figure 6. STEVAL-ALOCKCB circuit schematic (6 of 10)

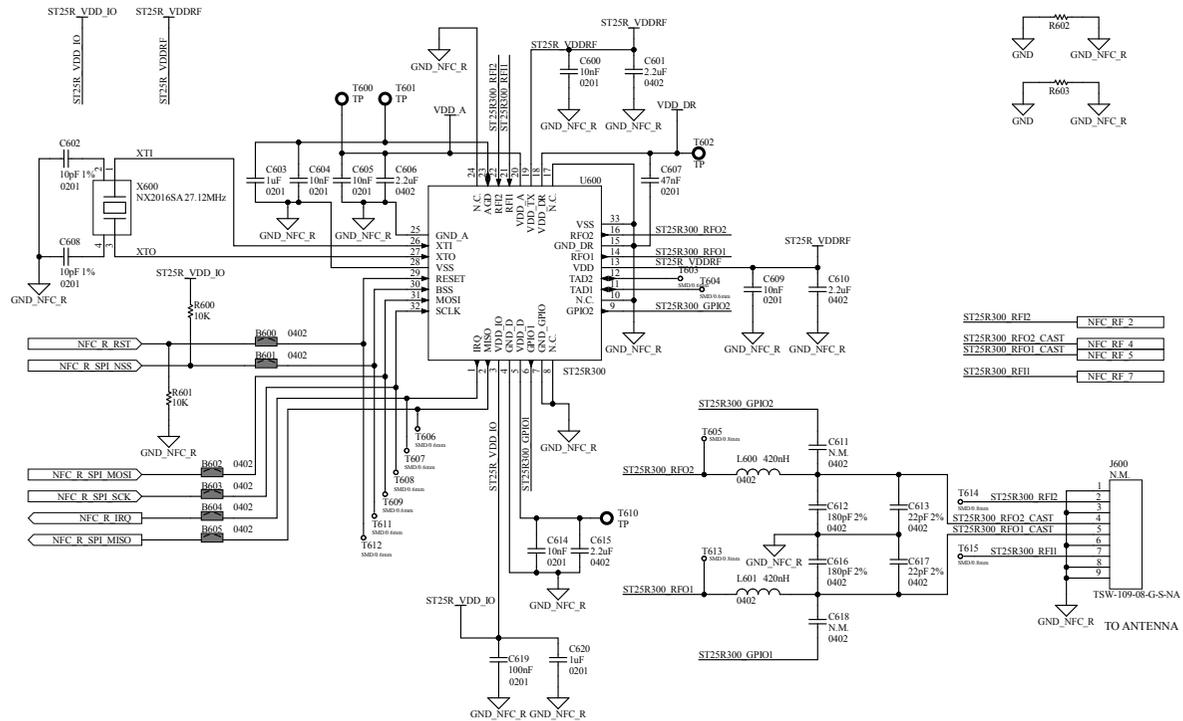


Figure 7. STEVAL-ALOCKCB circuit schematic (7 of 10)

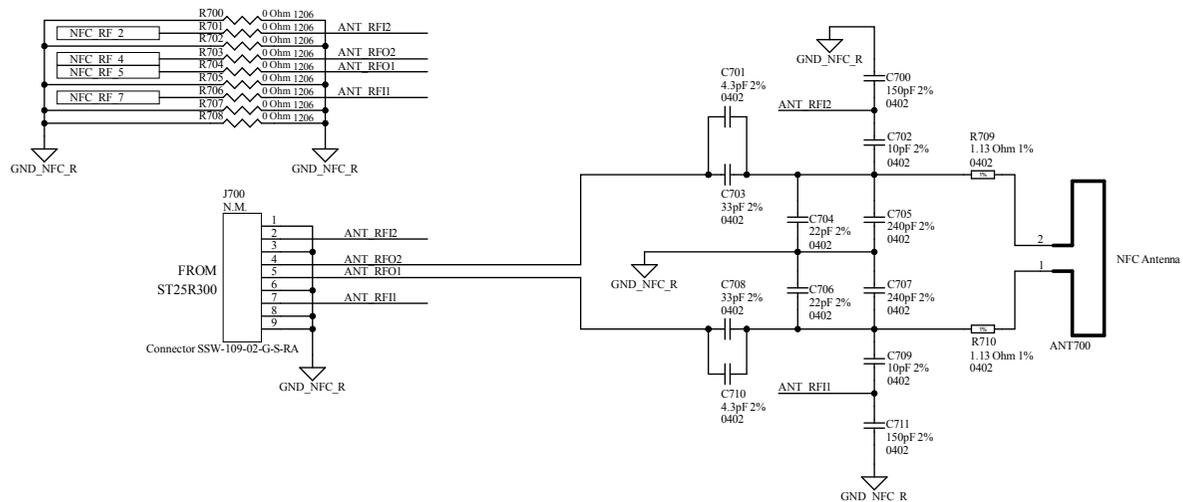


Figure 8. STEVAL-ALOCKCB circuit schematic (8 of 10)

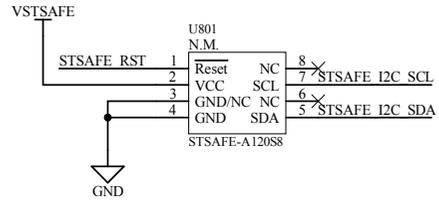
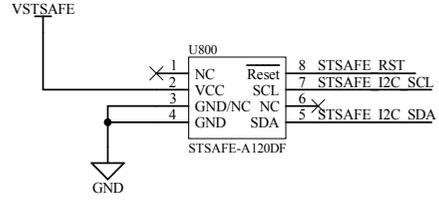
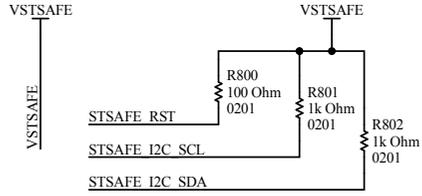


Figure 9. STEVAL-ALOCKCB circuit schematic (9 of 10)

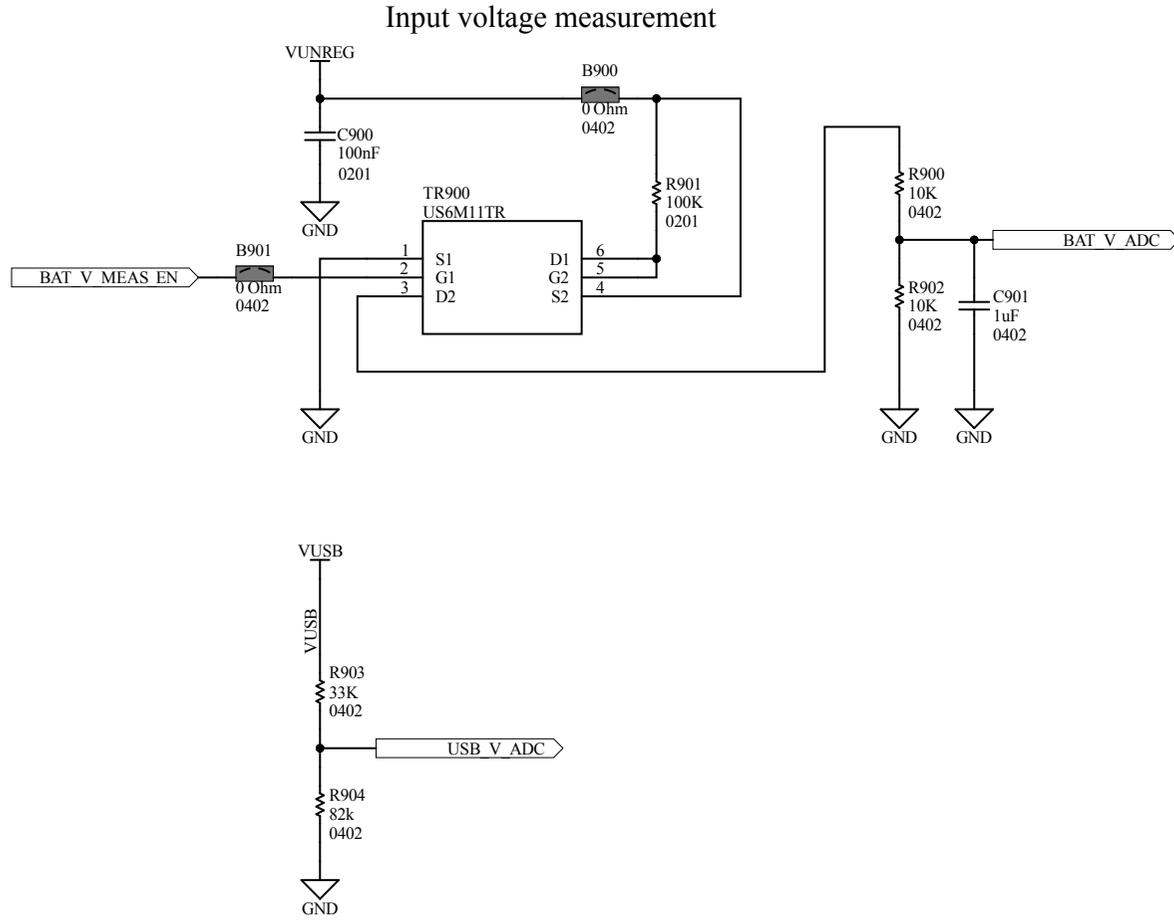
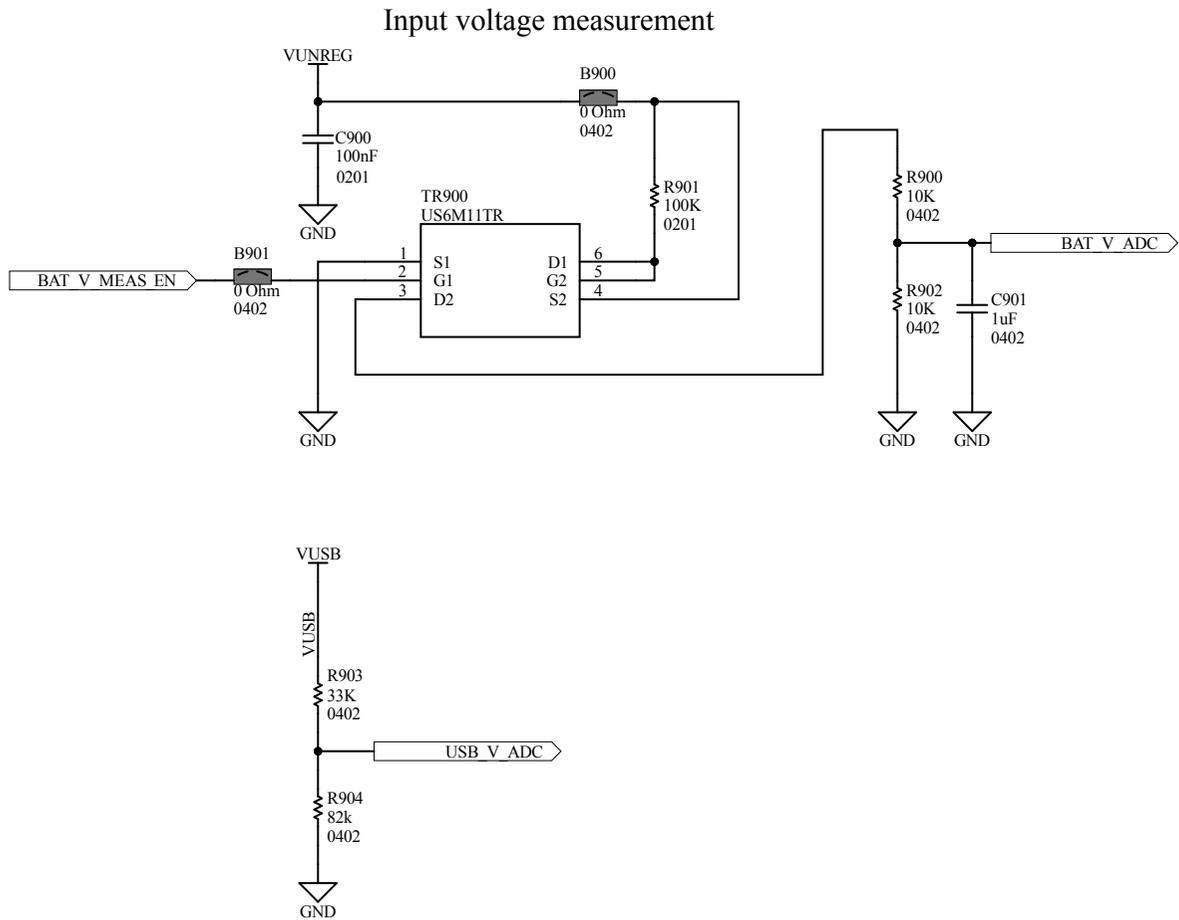


Figure 10. STEVAL-ALOCKCB circuit schematic (10 of 10)





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 |
|-------------|----------|------------------|
| 19-Feb-2026 | 1 | Initial release. |

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