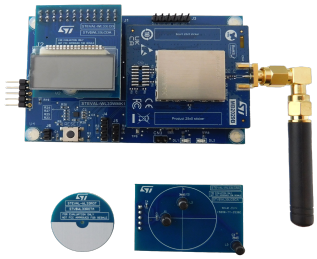
STEVAL-WL33WMKCB

Data brief

Water metering based on LCSC using STM32WL33



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

Product summary	
Water metering based on LCSC using STM32WL33	STEVAL-WL33WMKCB
Software for water metering board STEVAL-WL33WMKCB	STSW-WL33WMKCB
Sub-GHz Wireless Microcontrollers. Single-core Arm Cortex-M0+ @64 MHz with 256 Kbytes of Flash memory, 32 Kbytes of SRAM	STM32WL33CCV6TR
STM32 Nucleo-64 RF board with Sub-1 GHz radio subsystem	MB2029B (included in NUCLEO-WL33CC1)
STM32 Nucleo-64 development board with STM32WL33CC MCU	NUCLEO-WL33CC1
Applications	Water metering

Features

- Dedicated board for water metering using LCSC
- MB2029B, STEVAL-WL33LCSC, and STEVAL-WL33LCD daughter boards mounted over STEVAL-WL33WMK1
- Two user LEDs for indicating the direction of rotation of the wheel
- Off-board STLINK-V3EC debugger / programmer capability
- Transceiver with integrated RF front-end optimized for the 863–870 MHz frequency band
- Supporting OOK, ASK, 2(G)FSK, 4(G)FSK, and D-BPSK modulations, with LoRa®
- Proprietary protocol support, featuring a highly integrated sub-GHz radio and Arm Cortex-M0+ core
- Compatible with standardized wireless protocols wM-Bus
- Low-power autonomous wake-up receiver
- Data delivered with SMA antenna
- RoHS compliant

Description

The water metering STEVAL-WL33WMKCB board is composed of the MB2029 mother board, where the STM32WL33CC board is mounted, the STEVAL-WL33LCSC LC board for water meter flow measurement, and the STEVAL-WL33LCD LCD board.

It can show the corresponding revolutions with STEVAL-WL33WMK1 over LCD on STEVAL-WL33LCD.

The MCU RF board MB2029 houses the STM32WL33CC microcontroller, which is an ultralow power device with an embedded sub-GHz transceiver for wireless communication.

It shows the corresponding revolutions with the STEVAL-WL33WMK1 over LCD on STEVAL-WL33LCD.

The STEVAL-WL33WMK1 features two user LEDs that indicate the wheel's rotation in clockwise or anticlockwise directions.

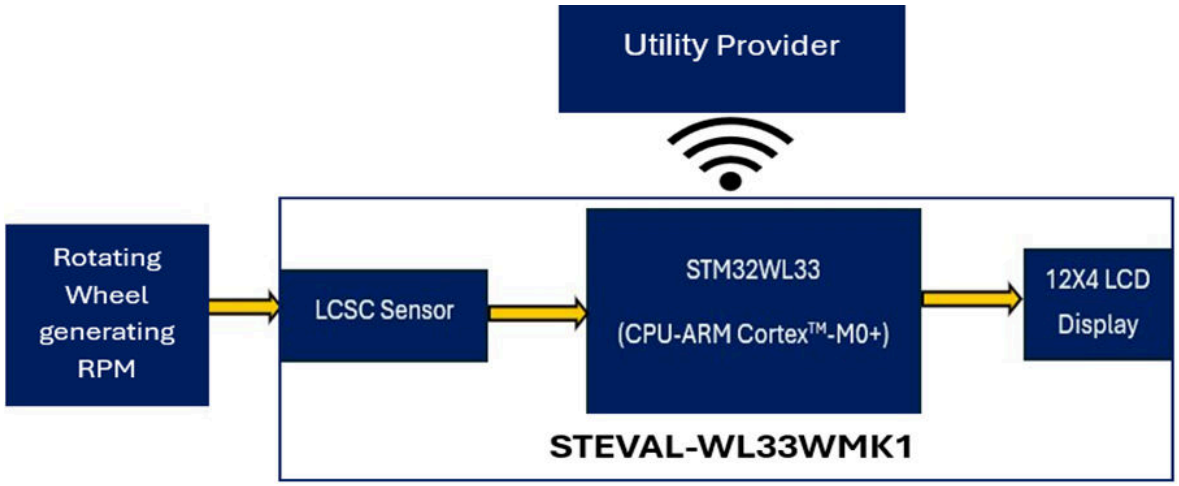
The board can improve water supply management, distribution efficiency, customer service, and billing processes by supporting advanced features such as multitariff billing.

1 Detailed description

The STEVAL-WL33WMK1 works with an LCSC board to measure the wheel' s revolutions in both clockwise and counterclockwise directions.

The board shows the counts on an LCD display and transmits the data back to the utility for wireless monitoring using the MB2029 RF board.

Figure 1. Functional block diagram



Ultralow power wireless STM32WL33CC microcontroller based on the Arm Cortex®-M0+ core, with 256 Kbytes of flash memory and 32 Kbytes of SRAM in a VFQFPN48 package featuring:

- Ultra-low-power MCU (that is) 8 mA TX @ +10 dBm and 4 mA in Rx high-performance mode
- Air data rate from 0.1 to 600 kbps
- Transceiver with integrated RF front-end optimized for the 863–870 MHz frequency band, supporting OOK, ASK, 2(G)FSK, 4(G)FSK, and D-BPSK modulations, with LoRa® and proprietary protocol support, featuring a highly integrated sub-GHz radio and Arm Cortex-M0+ core
- Compatible with standardized wireless protocol WM-Bus
- Low-power autonomous wake-up receiver

The LCSC sensor, which forms an LC network is made up of an inductance (L) and a capacitor (C) connected in parallel, which causes oscillations.

A portion of the magnetic field that the inductor emits is absorbed and energy is lost in the metal target when it is close to the LC sensor. As a result, both the oscillation amplitude and the total number of captured pulses are smaller than in the case of no metal.

To ascertain the wheel' s location, LCSC monitors the oscillations' damping time (when it is close to metal).

The microcontroller continuously measures these changes in oscillation amplitude and damping time to accurately count each revolution of the water meter wheel.

It also determines the direction of rotation by analyzing the sequence of signal variations. This data is then processed in real time and displayed on the LCD screen for immediate feedback.

Simultaneously, the processed information is transmitted wirelessly using the wireless M-Bus protocol, enabling secure and reliable communication with utility networks for remote monitoring and management.

The system’s low-power consumption ensures long battery life, making it suitable for deployment in locations without easy access to power.

This approach allows utilities to monitor water usage accurately, detect reverse flow or tampering, and improve billing and customer service through reliable and timely data.

2 Schematic diagrams

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

Figure 2. STEVAL-WL33WMKCB circuit schematic (1 of 6)

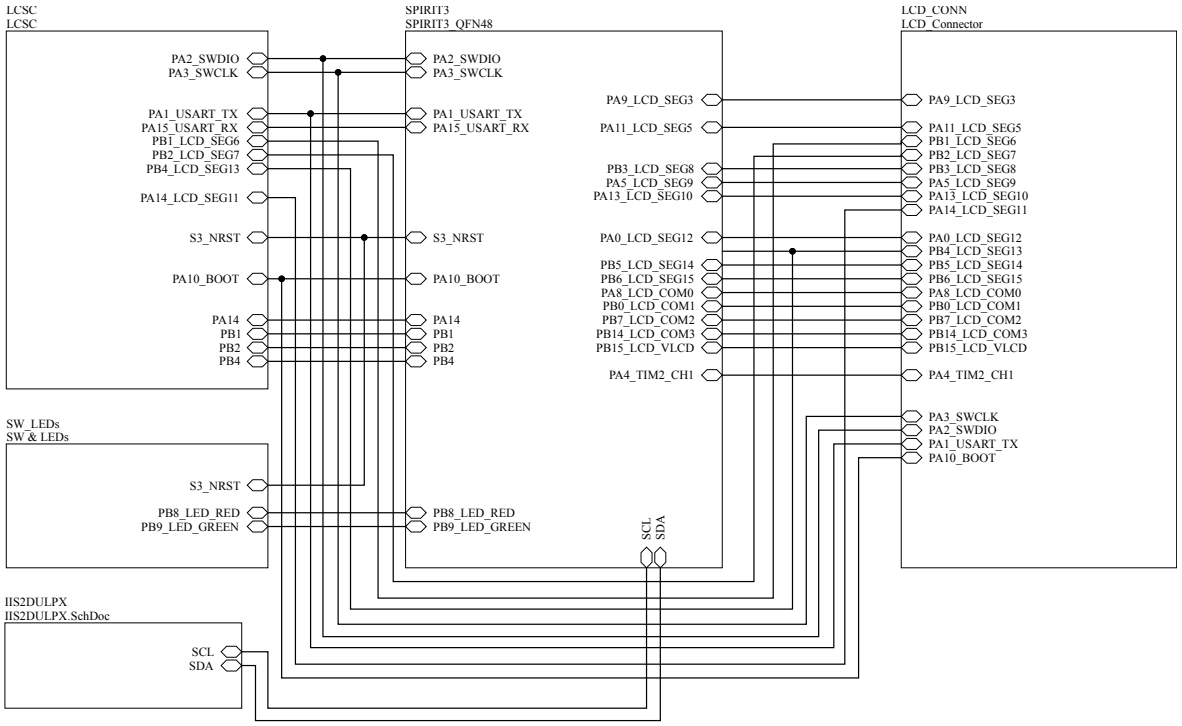
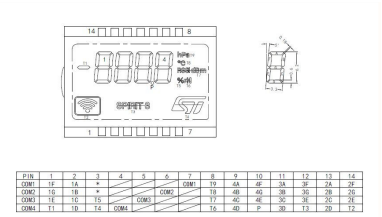
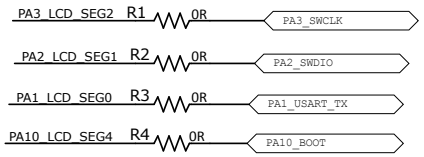


Figure 3. STEVAL-WL33WMKCB circuit schematic (2 of 6)





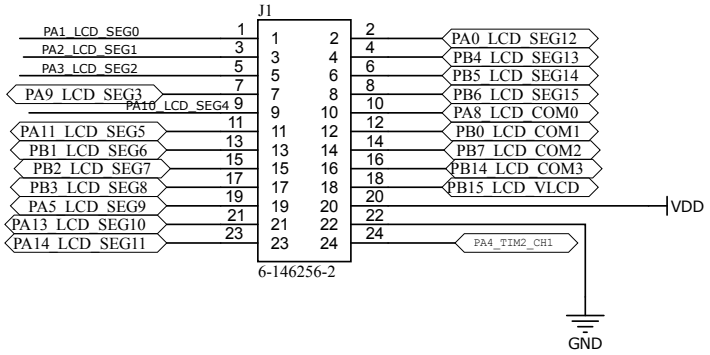
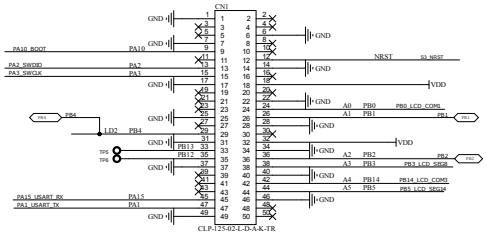
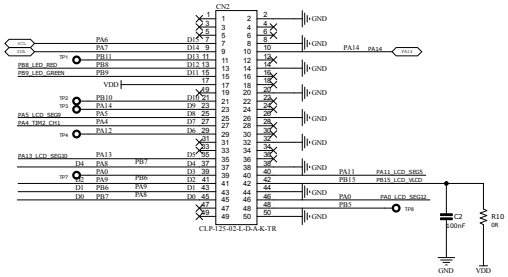


Figure 4. STEVAL-WL33WMKCB circuit schematic (3 of 6)





Test points

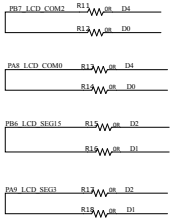


Figure 5. **STEVAL-WL33WMKCB circuit schematic (4 of 6)**

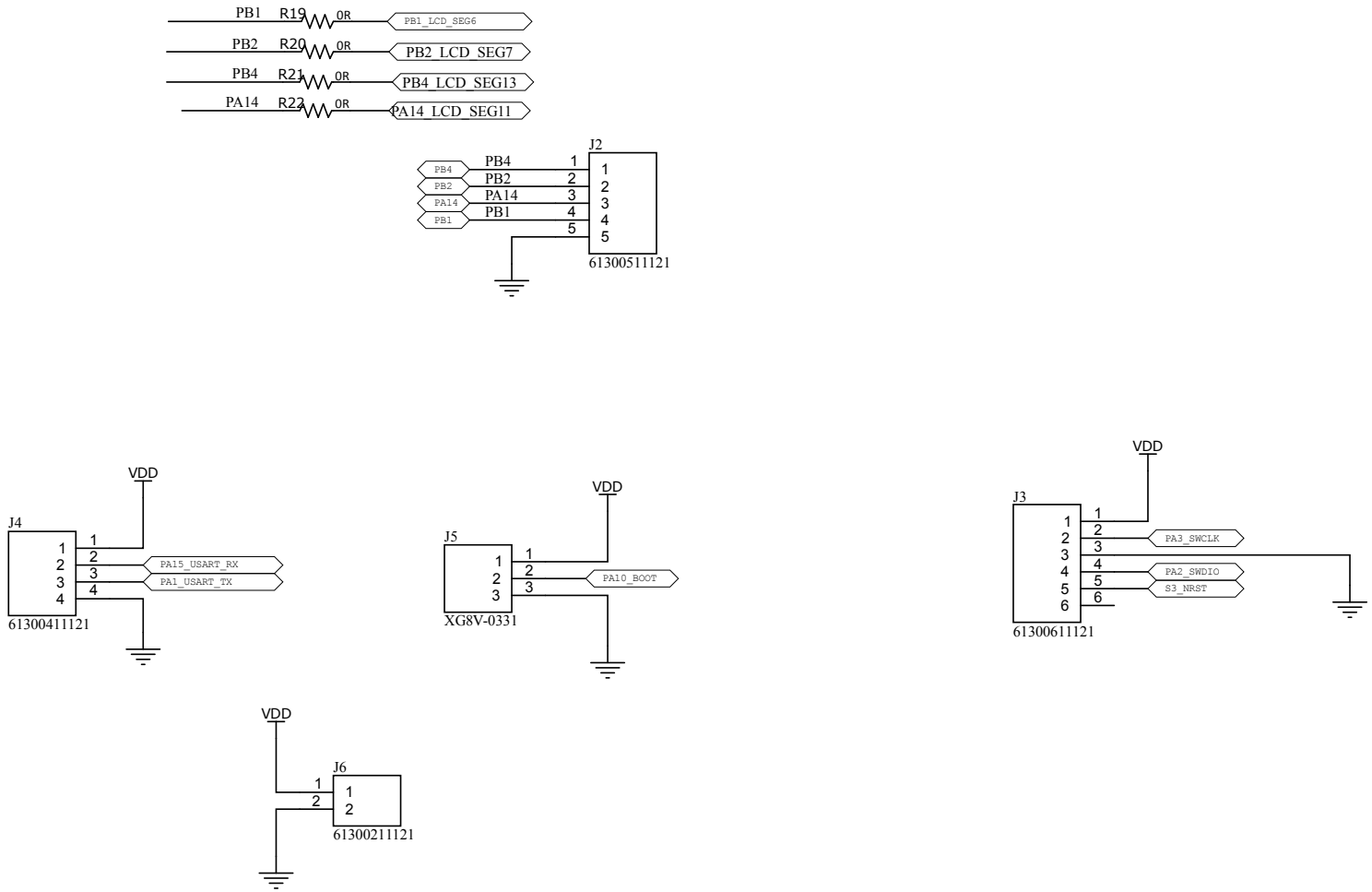


Figure 6. **STEVAL-WL33WMKCB circuit schematic (5 of 6)**

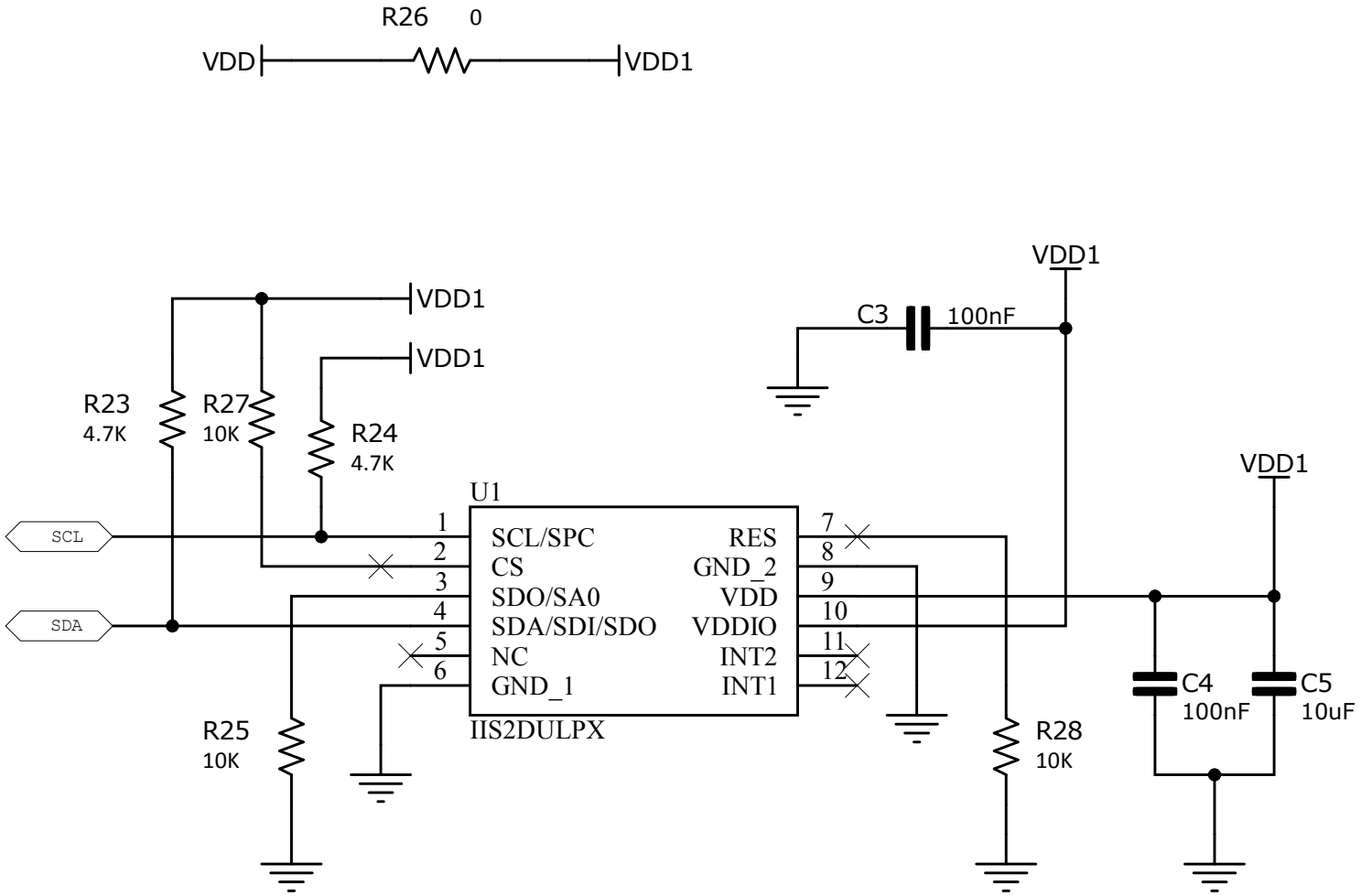


Figure 7. STEVAL-WL33WMKCB circuit schematic (6 of 6)

BUTTONs AND LEDs

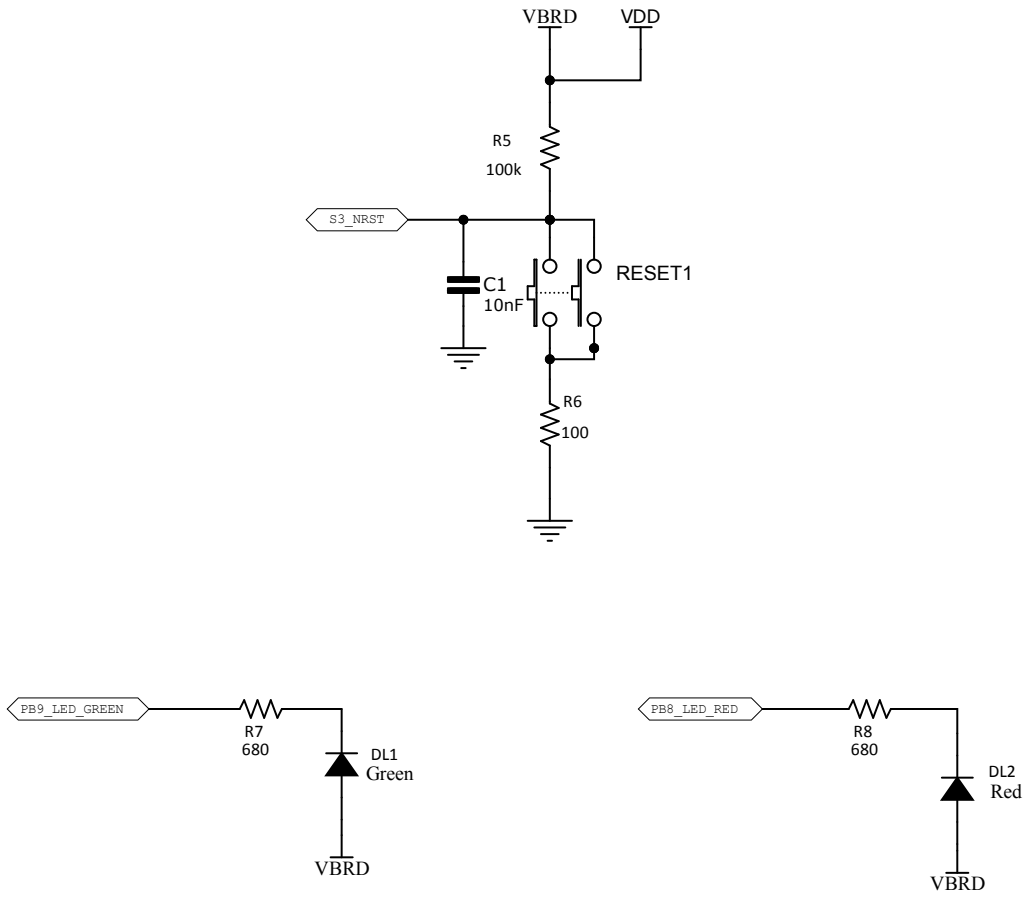
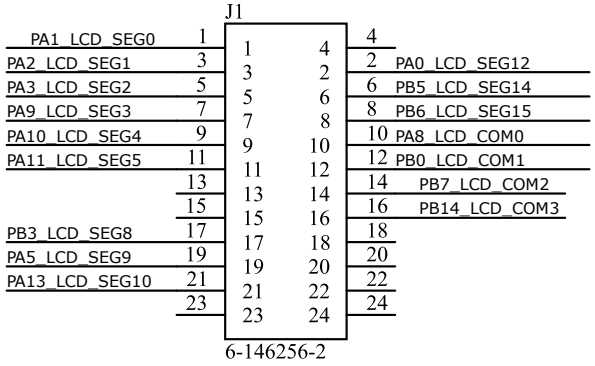


Figure 8. **STEVAL-WL33LCD circuit schematic (1 of 1)**



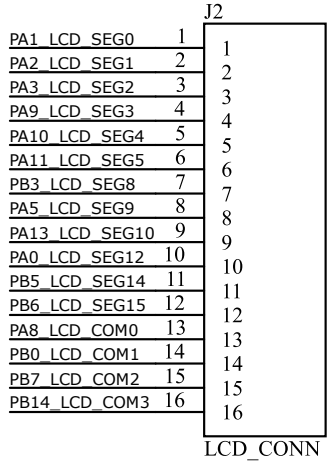
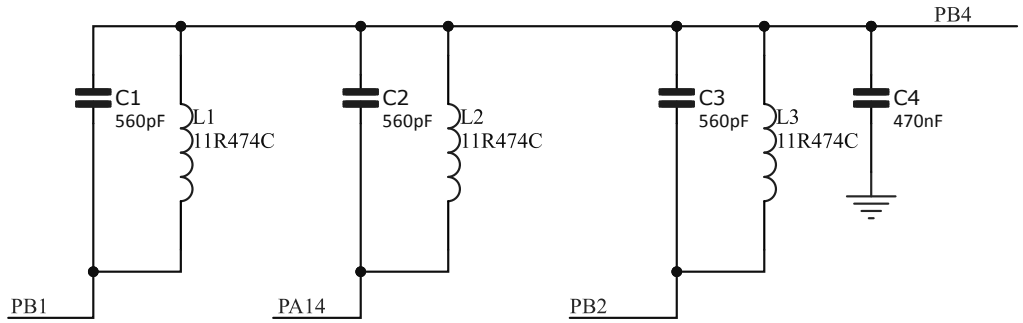
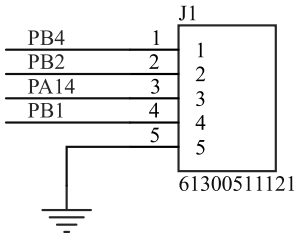


Figure 9. **STEVAL-WL33LCSC circuit schematic (1 of 1)**





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
04-Dec-2025	1	Initial release.

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