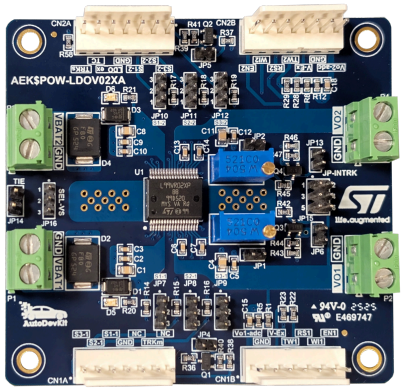
AEK-POW-LDOV02X

Data brief

Dual linear voltage regulator evaluation board with configurable output voltage and diagnostic features based on automotive-grade L99VR02XP



AutoDevKit

Product summary	
Dual automotive-grade linear voltage regulator evaluation board with configurable output voltage and diagnostic features based on L99VR02XP	AEK-POW-LDOV02X
Dual automotive linear voltage regulator with configurable output voltage (2 x 250 mA current capability)	L99VR02XP-TR
All-in-one, fast-prototyping, user-friendly MCU and motor control evaluation board based on the Chorus SPC58EC80E5 automotive microcontroller	AEK-MCU-C4MINI1
AutoDevKit Studio for 32-bit power architecture MCUs	STSW-AUTODEVKIT
Applications	Power distribution Digital power Navigation systems

Features

- L99VR02XP dual automotive-grade linear voltage regulator
- User-selectable output voltages (0.8, 1.2, 1.5, 1.8, 2.5, 2.8, 3.3, and 5 V) with up to 250 mA load current capability per channel (LDO1 and LDO2)
- Protection and diagnostic features:
  - Enable pin for enabling/disabling the voltage regulator
  - Reset
  - Watchdog
  - Advanced thermal warning with output overvoltage detection
  - Undervoltage lockout
  - Programmable short-circuit output current (Ishort)
  - Fast output discharge
  - Short-to-battery output protection
  - The two internal LDOs have separate thermal clusters and temperature sensors
  - Thermal shutdown and short-circuit protection
  - LDO2 automatic voltage tracking and de-tracking with respect to LDO1 or to an external voltage regulator
- Compact size: 71 mm x 66 mm
- Included in the AutoDevKit ecosystem

Description

The AEK-POW-LDOV02X is an evaluation board based on the L99VR02XP dual automotive-grade linear voltage regulator.

The L99VR02XP operates with reduced input voltage, minimizing the internal power dissipation and maximizing the output current.

Output current limitation protects the regulator and the application from overload conditions, such as short to ground.

Thanks to its operating temperature range (Tj=-40°C to 175°C), the device is suitable for electronic applications with high temperature environments and for applications that require stable power supplies (for example, navigation systems, microcontroller supplies, audio systems, automotive display drivers, sensors, infotainment processors, and powertrain systems).

In automotive systems, thermal performance is always a critical concern for battery-direct-connection LDOs. The LDO connected to a car battery needs to convert the battery voltage down to 5, 3.3 V, or even lower voltage for powering MCU, CAN bus, and other devices. In these situations, the voltage drop on the LDO might be very high and power dissipation on the LDO might even exceed 1 W for a 100-mA loading current. If the system demands several hundred milliamps of current, a single LDO cannot handle the power dissipation.

Our AEK-POW-LDOV02X evaluation board addresses this challenge, thanks to the L99VR02XP dual linear voltage regulator, reaching a higher output current and distributing power consumption among multiple devices.

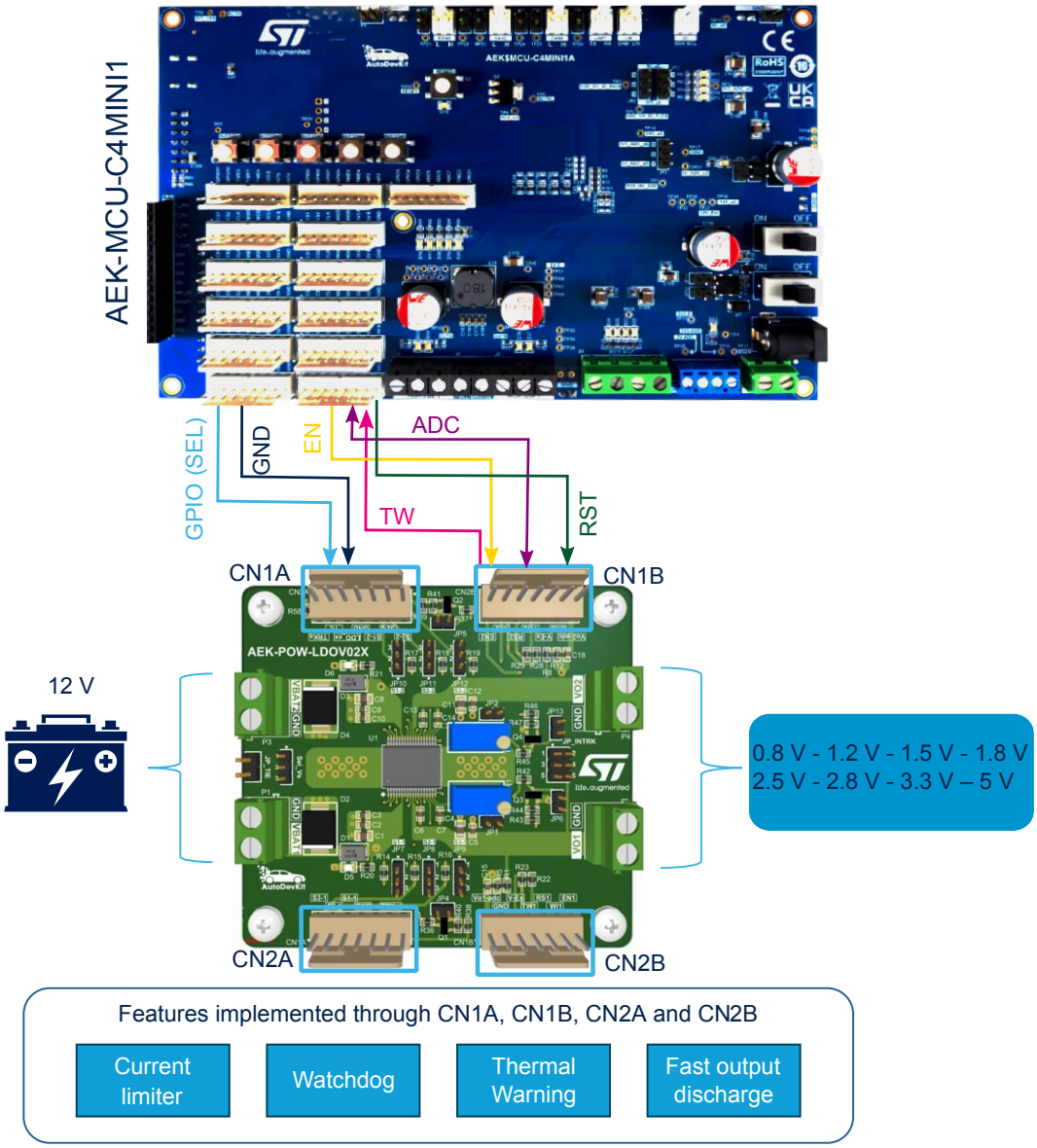
Product summary	
	MCU supplies Audio systems Automotive display drivers Powertrain systems Sensors

LDO2 automatic voltage tracking and de-tracking of LDO1 or of an external LDO voltage represents an accurate solution for automotive off-board sensors and small current off-board modules, where the power supply runs through a long cable from the main board.

Under this condition, the long cable might be damaged, causing short-to-ground, short-to-battery or other fault events. In these cases, the system needs to implement a mechanism to protect on-board components from being damaged. Meanwhile, it is necessary to keep the voltage-tracking tolerance between the off-board sensors power supply and the MCU/ADC power supply to the lowest level. In this scenario, the voltage-tracking LDO represents the perfect solution for driving the off-board loads, offering full protection features and ultra-accurate output tracking voltage.

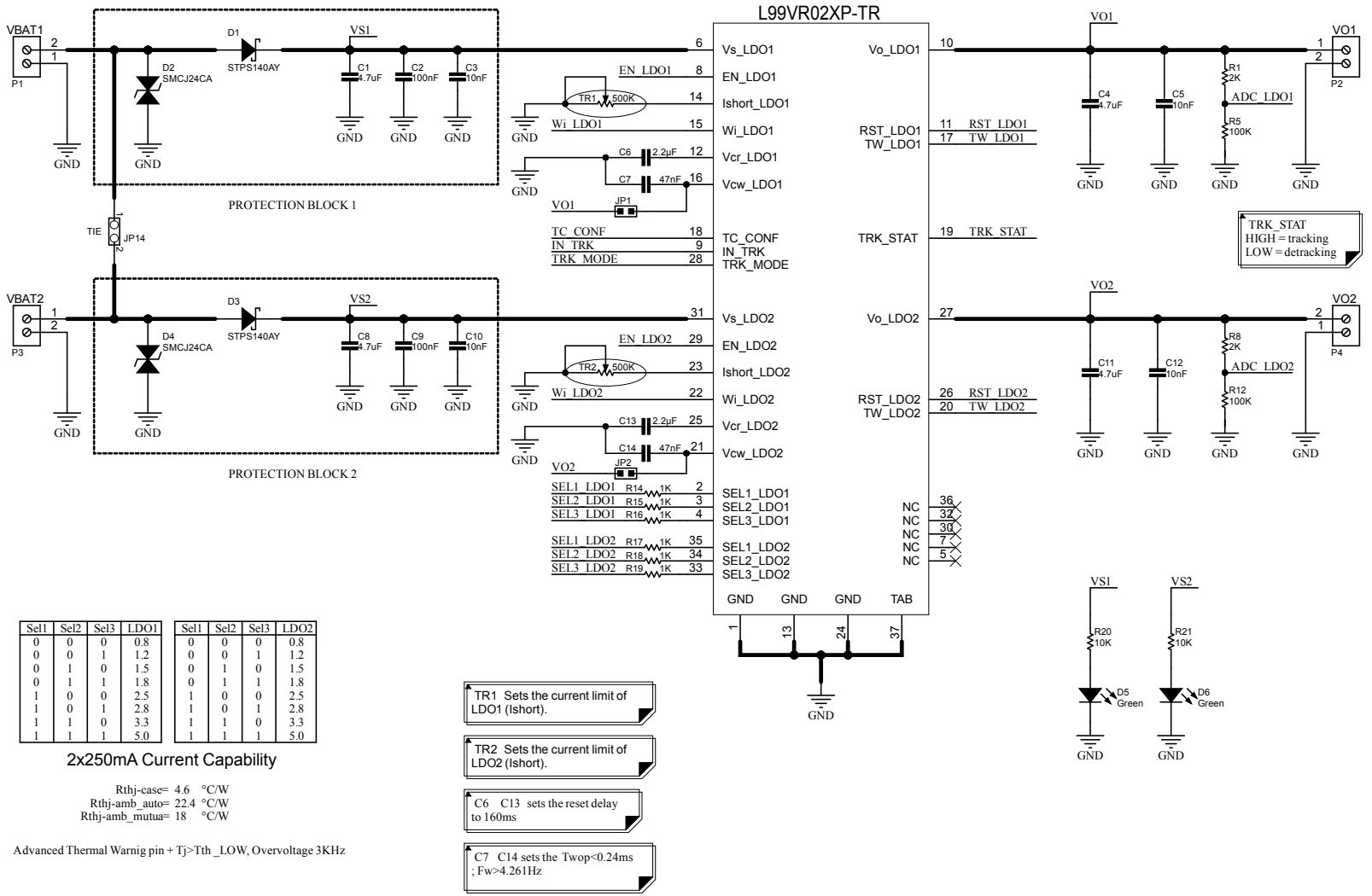
1 System requirements, HW and SW resources

Figure 1. **AEK-POW-LDOV02X block diagram with connection to an MCU board**



2 Schematic diagrams

Figure 2. **AEK-POW-LDOV02X circuit schematic (1 of 3)**



Sel1	Sel2	Sel3	LDO1
0	0	0	0.8
0	0	1	1.2
0	1	0	1.5
0	1	1	1.8
1	0	0	2.5
1	0	1	2.8
1	1	0	3.3
1	1	1	5.0

Sel1	Sel2	Sel3	LDO2
0	0	0	0.8
0	0	1	1.2
0	1	0	1.5
0	1	1	1.8
1	0	0	2.5
1	0	1	2.8
1	1	0	3.3
1	1	1	5.0

2x250mA Current Capability

Rthj-case= 4.6 °C/W
Rthj-amb_auto= 22.4 °C/W
Rthj-amb_mutua= 18 °C/W

Advanced Thermal Warnig pin + Tj>Tth _LOW, Overvoltage 3KHz

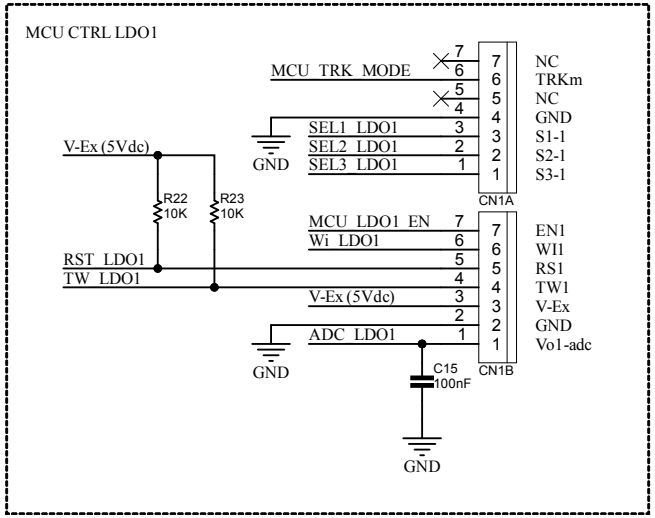
TR1 Sets the current limit of LDO1 (Ishort).

TR2 Sets the current limit of LDO2 (Ishort).

C6 C13 sets the reset delay to 160ms

C7 C14 sets the Twop<0.24ms ; Fw>4.261Hz

Figure 3. AEK-POW-LDOV02X circuit schematic (2 of 3)



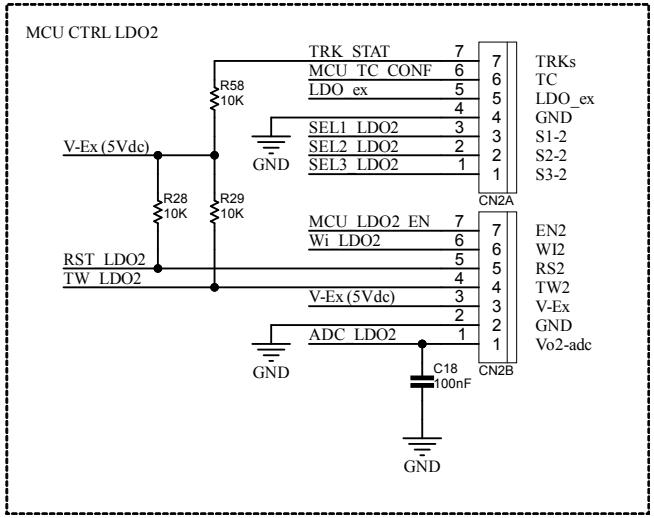
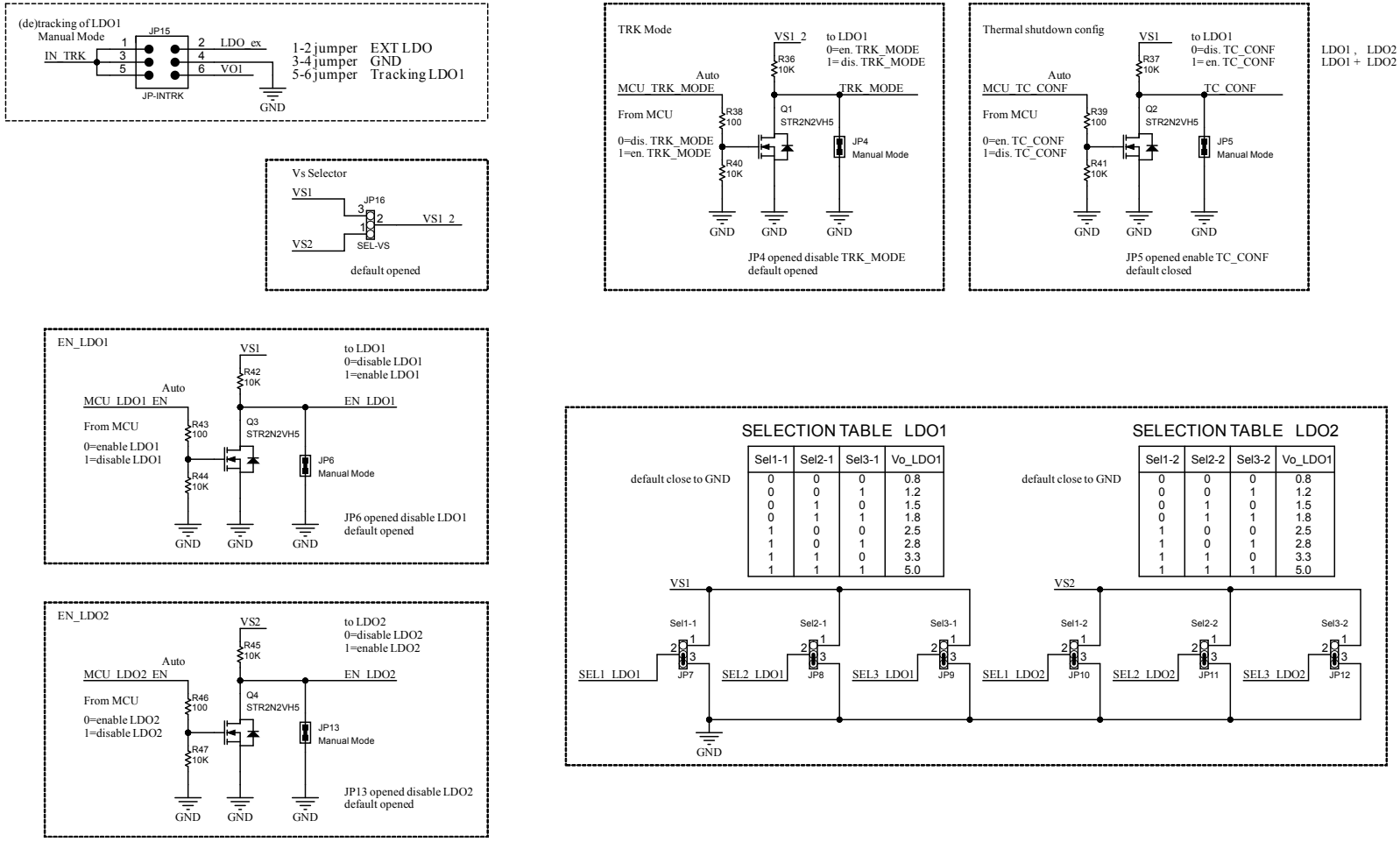


Figure 4. AEK-POW-LDOV02X circuit schematic (3 of 3)



3 Board versions

Table 1. AEK-POW-LDOV02X versions

Finished good	Schematic diagrams	Bill of materials
AEK$POW-LDOV02XA(1)	AEK$POW-LDOV02XA schematic diagrams	AEK$POW-LDOV02XA bill of materials

1. *This code identifies the AEK-POW-LDOV02X evaluation board first version.*

Revision history

Table 2. **Document revision history**

Date	Revision	Changes
11-Jul-2025	1	Initial release.
30-Jul-2025	2	Updated title on cover page.

IMPORTANT NOTICE – READ CAREFULLY

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice.

In the event of any conflict between the provisions of this document and the provisions of any contractual arrangement in force between the purchasers and ST, the provisions of such contractual arrangement shall prevail.

The purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgment.

The purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of the purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

If the purchasers identify an ST product that meets their functional and performance requirements but that is not designated for the purchasers' market segment, the purchasers shall contact ST for more information.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, refer to www.st.com/trademarks. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.