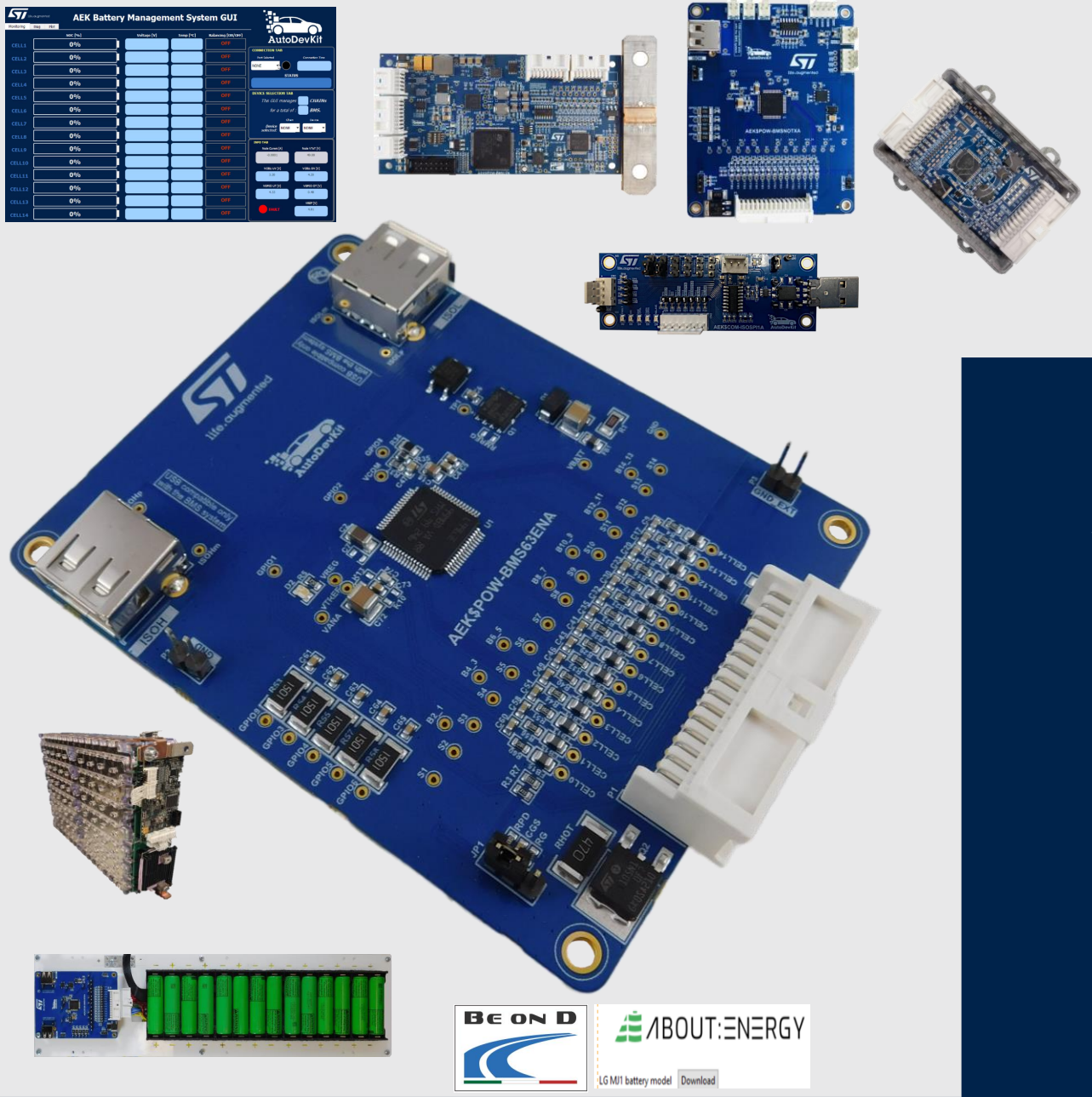

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Battery management system solution based on L9963E and L9963T

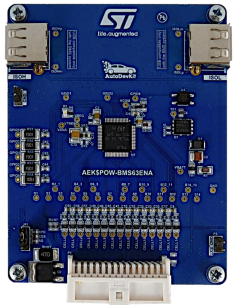
Quick start guide

Ver 2.6.1

Our portfolio of BMS evaluation tools

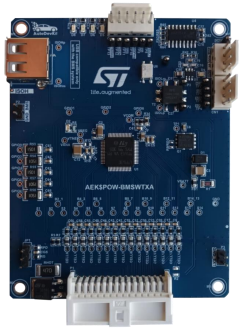
- **L9963E** node board with current sensing enabled and simplified connector

Order code:
AEK-POW-BMS63EN



- Battery management system module with embedded transceiver for isolated communication

Order code:
AEK-POW-BMSWTX



- Optimized form-factor and packaged battery management L9963E node for battery pack easy mounting

Order code:
AEK-POW-BMSCC

- General purpose programmable ISOSPI <> SPI transceiver board based on **L9963T**

Order code:
AEK-COM-ISOSPI1

- Non-isolated battery management node dedicated to auxiliary battery packs able to directly connect to the MCU via standard SPI protocol

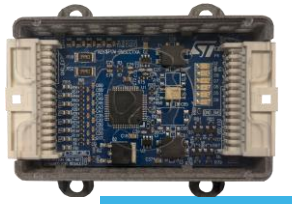
Order code:
AEK-POW-BMSNOTX

- Battery holder for cylindrical batteries and battery management system node for automotive applications

Order code:
AEK-POW-BMSHOLD

- Optimized form-factor and packaged battery management node for battery pack easy mounting with embedded transceiver

Order code:
AEK-POW-BMSCCTX



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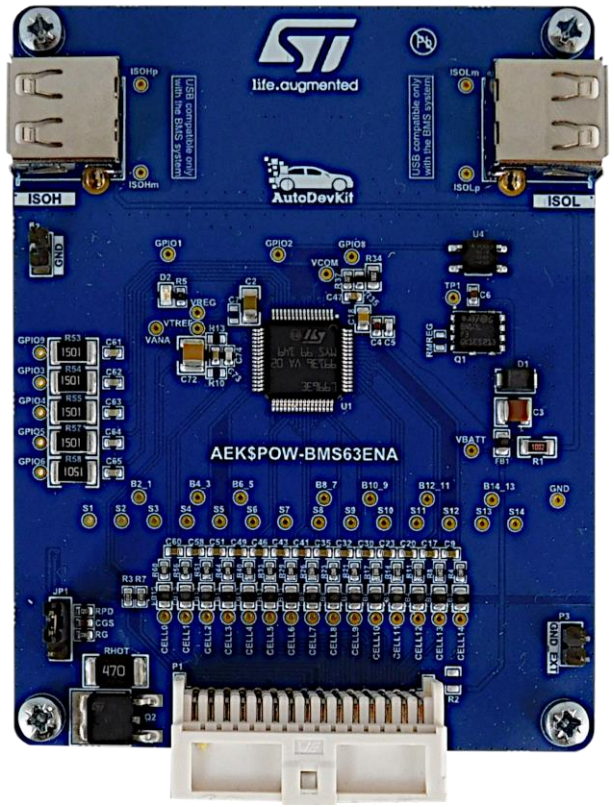
New release of BMS evaluation tools 1/9

- **L9963E** node board with current sensing enabled and simplified connector



Order code:
AEK-POW-BMS63EN

- General purpose programmable ISOSPI <> SPI transceiver board based on **L9963T**

Order code:
AEK-COM-ISOSPI1

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New release of BMS evaluation tools 2/9

AEK-POW-BMSNOTX

- Single battery node for **direct non-isolated communication** with MCU via SPI protocol.
- Based on **L9963E** battery management IC
- Dedicated connector for **Fault line**
- Dedicated connector for MCU ADCs **for 3 NTCs** going to the batteries and one measuring the board temperature.

Included in:
AutoDevKit Studio version 2.4.0

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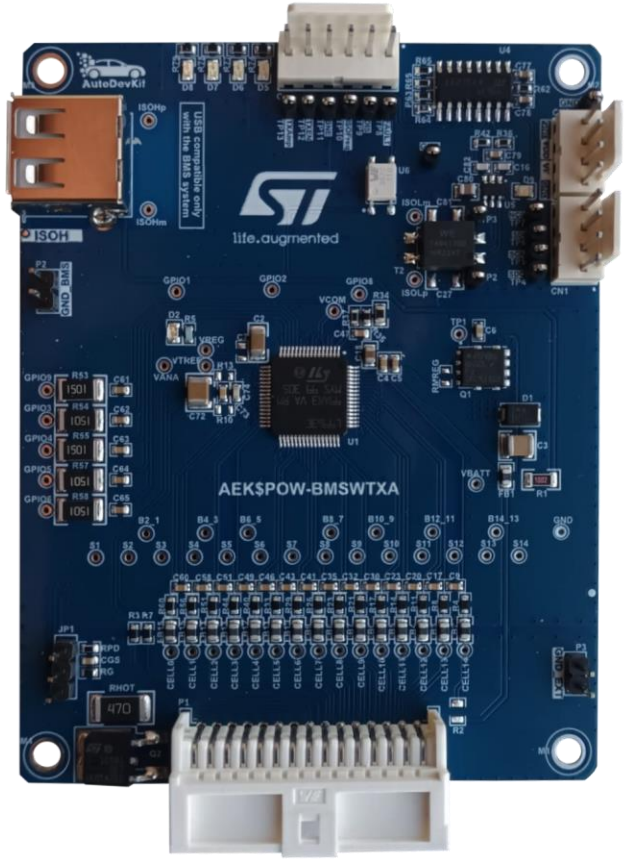
New release of BMS evaluation tools 3/9

AEK-POW-BMSWTX

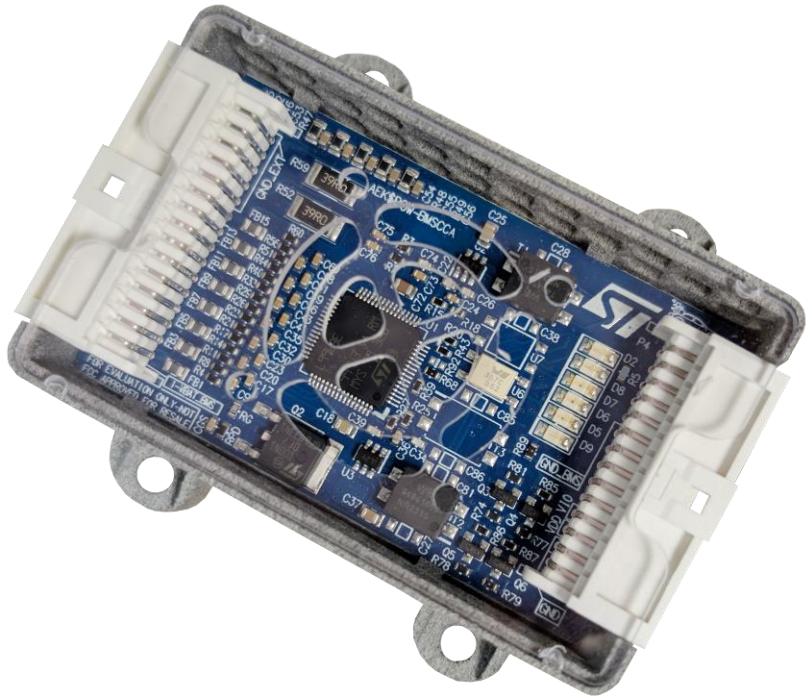


- Single battery node with integrated ISOSPI<>SPI transceiver for **direct isolated communication** with MCU via SPI protocol.
- Based on **L9963E** battery management IC and **L9963T** transceiver.

Included in:
AutoDevKit Studio version 2.4.0

New release of BMS evaluation tools 4/9

AEK-POW-BMSCC



- Optimized form-factor and packaged battery node for battery pack easy mounting, enabling more batteries to be installed within the same volume.
- Based on **L9963E** battery management IC.

Included in:
AutoDevKit Studio version 2.6.1

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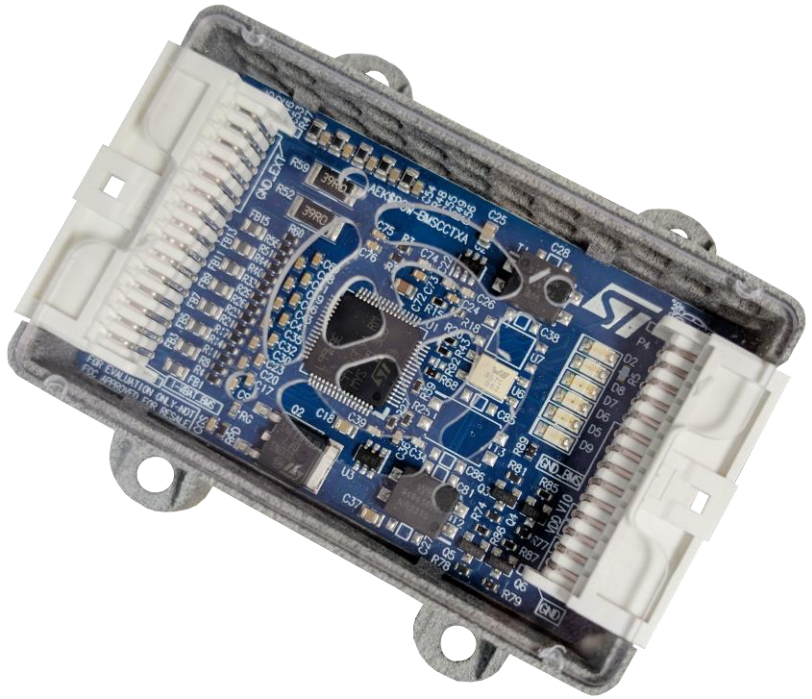
New release of BMS evaluation tools 5/9

AEK-POW-BMSCCTX



- Optimized form-factor and packaged battery node for battery pack easy mounting, enabling more batteries to be installed within the same volume.
- Integrated ISOSPI<>SPI transceiver for **direct isolated communication** with MCU via SPI protocol.
- Based on **L9963E** battery management IC and **L9963T** transceiver.

Included in:
AutoDevKit Studio version 2.6.1

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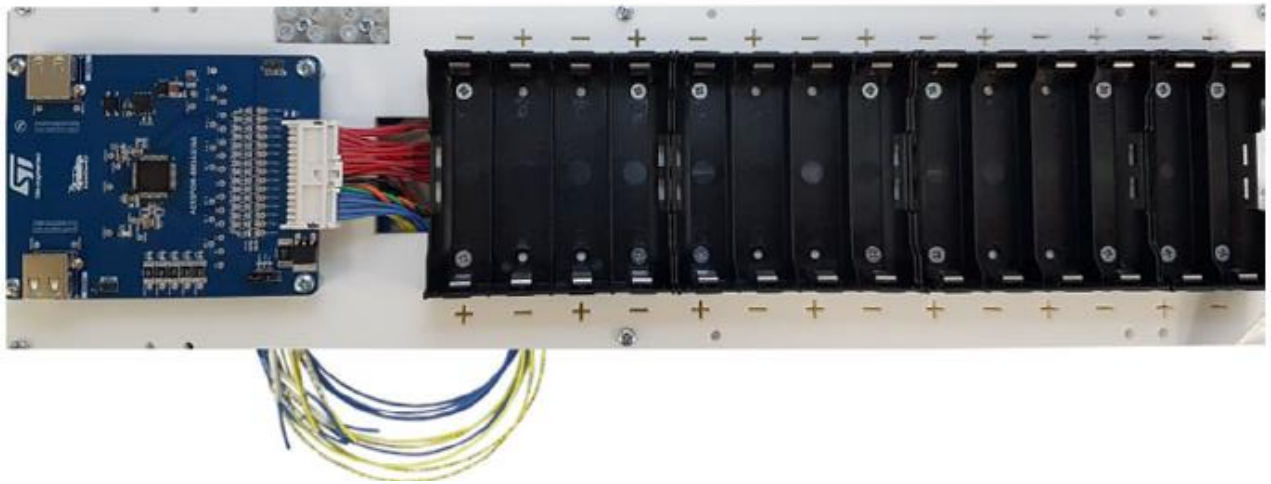
New release of BMS evaluation tools 6/9

Battery holder for cylindrical batteries



Order code:
AEK-POW-BMSHOLD

- 14-slot battery holder for cylindrical INR 18650 battery cells (not included)
- All batteries are connected in series
- Proper housing for the AEK-POW-BMS63EN BMS node (not included)
- Easy battery removal supported by a satin ribbon
- Low-side current sensing through an external resistor included in the package a 100 mΩ, 10 W resistor
- Five NTC thermistors (included)
- Stackable kit to build a compact battery pack (mechanical parts included)
- Dimensions 425 x 120 x 52 mm

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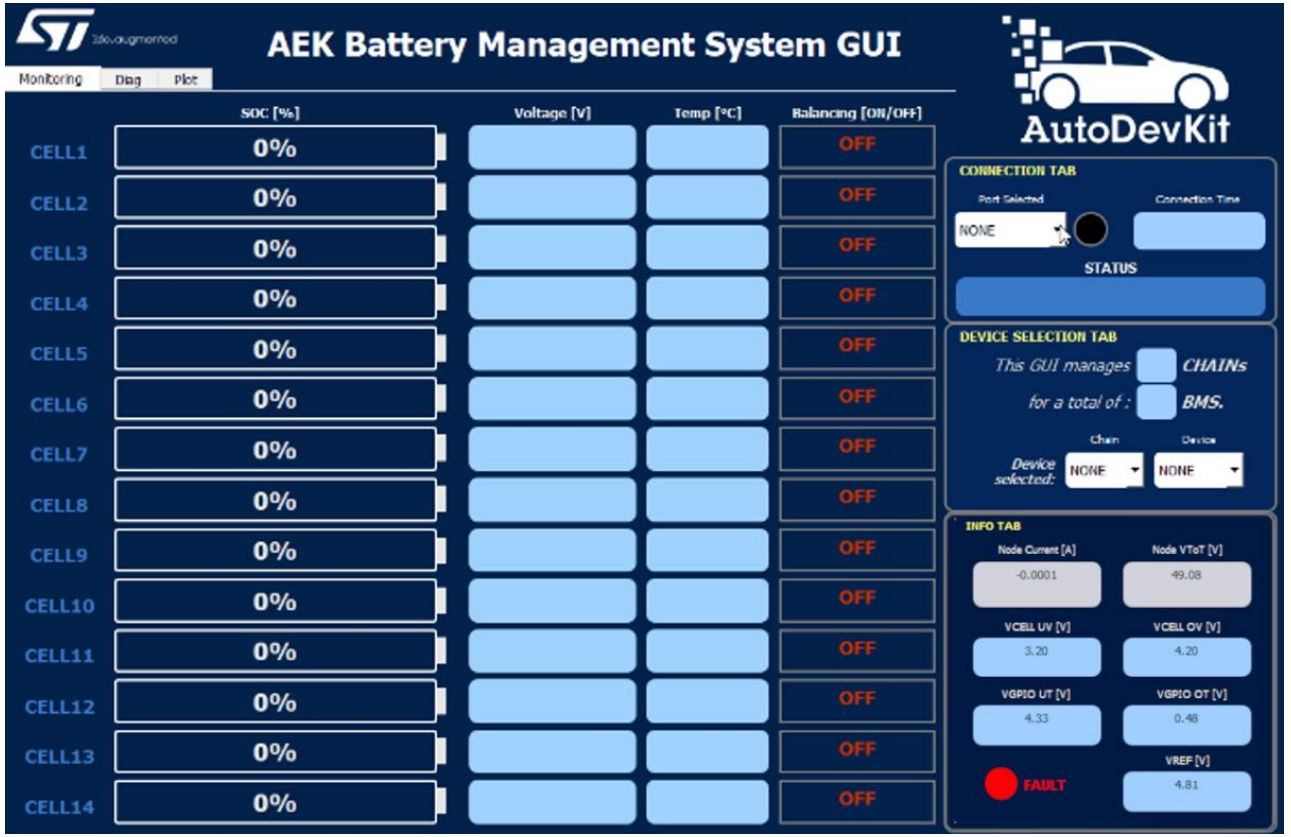
New release of BMS evaluation tools 7/9

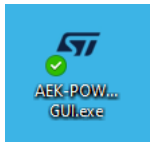
BMS GUI



- Window O.S. compatible executable program
- PC has to be connected with the serial port of the **AEK-MCU-C4MINI1** MCU board
- Two specific examples are importable from AutoDevKit Studio

AEK-MCU-C4MINI - AEK_POW_BMSCCTX_GUI_application for discovery
AEK-MCU-C4MINI - AEK_POW_BMSCCTX_2_nodes_chain_GUI_application for discovery

- Monitoring:
  - Single cell voltage and total voltage
  - Temperature and current
  - Balancing status
  - Faults
- Plots of total current and voltage over time



Included in:
AutoDevKit Studio version 2.6.1

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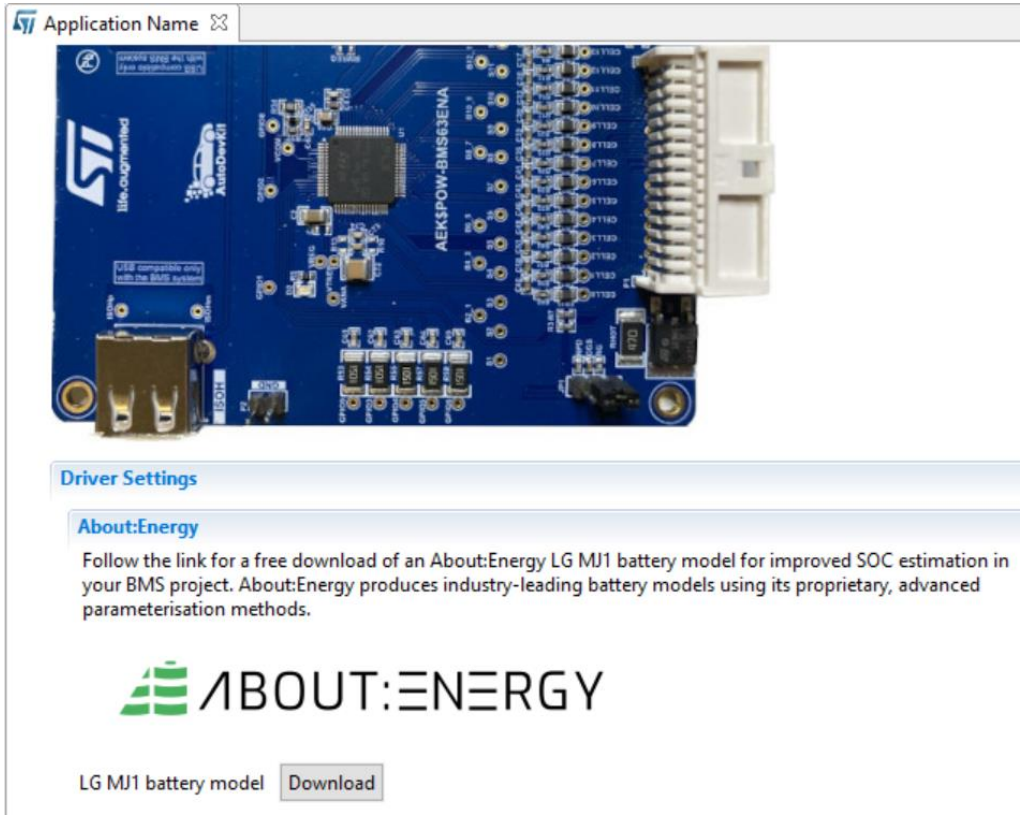
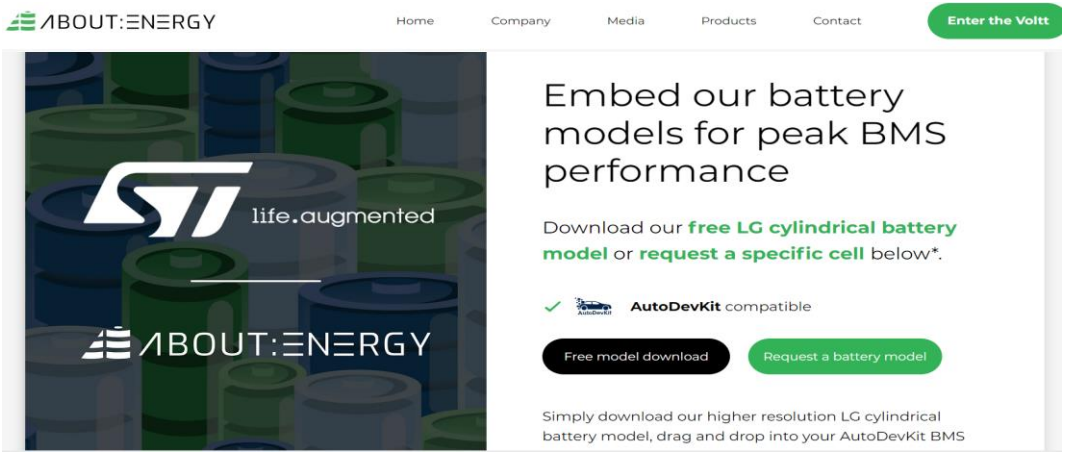
New release of BMS evaluation tools 8/9

Battery Model for precise SoC



- Access About:Energy battery model database directly from AutoDevKit Studio
- Download an AutoDevKit compatible data model for improved precision SoC calculation
- Explore About:Energy database for other battery chemistries or models
- Request a battery model for new custom batteries
- Visit: [STMicroelectronics | About:Energy (aboutenergy.io)]



Included in:
AutoDevKit Studio version 2.3.0

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New release of BMS evaluation tools 9/9

AEK-POW-BMSLV

- Single node battery pack for auxiliary power supply
- Total of 14s1p with max voltage <60 V
- Solution includes:
  - **SPC58EC** MCU
  - **L9963E** BMS IC
  - **L9963T** ISOSPI transceiver
  - **SPSB100** PMIC **(custom version)**
  - **VNQ7050AJTR** Contactor Driver
  - **SMA6T68AY** 600 W TVS
  - **USBLC6-2SC6Y** ESD Protection for high-speed line

In collaboration with: BE ON D

Included in:
AutoDevKit Studio version 2.4.0

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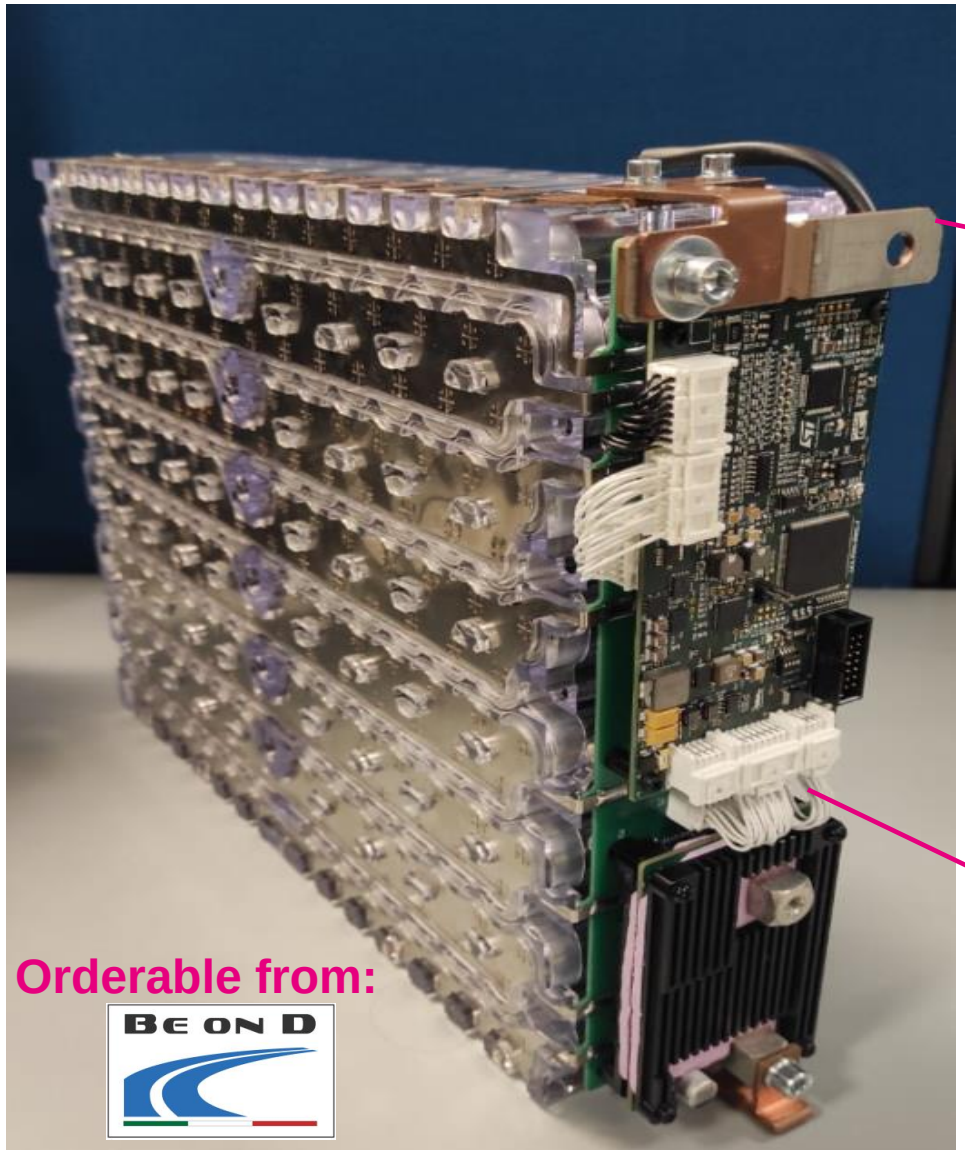
BMS Low Voltage solution installed on a battery pack



AEK-POW-BMSLV

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Battery management basic information

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MONITORING

Battery management systems (BMS) are electronic control circuits that monitor and regulate the charging and discharging of batteries.

SENSING

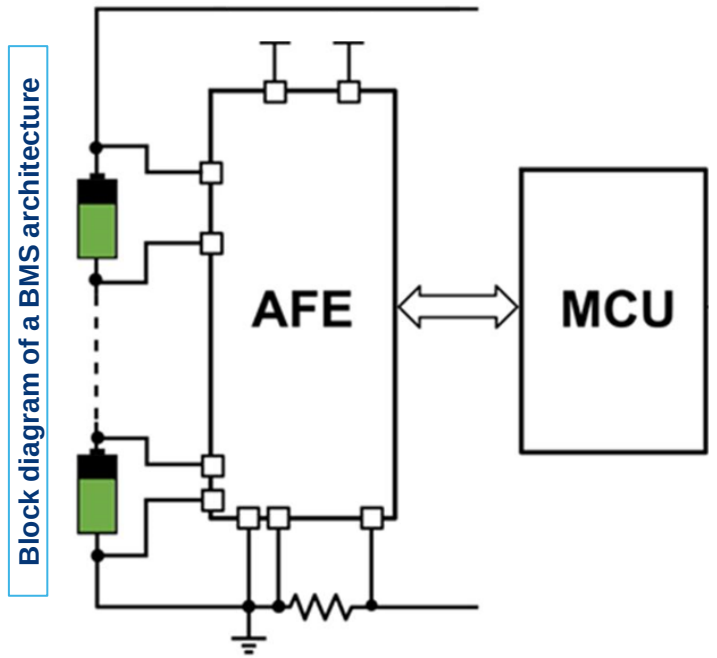
The battery characteristics to be monitored include the measure of voltages, temperature, state of charge, remaining operating time, state of health.

BALANCING

A battery management system also provides a cell balancing function, to manage that different battery cells have the same charging and discharging requirements.

PROTECTION

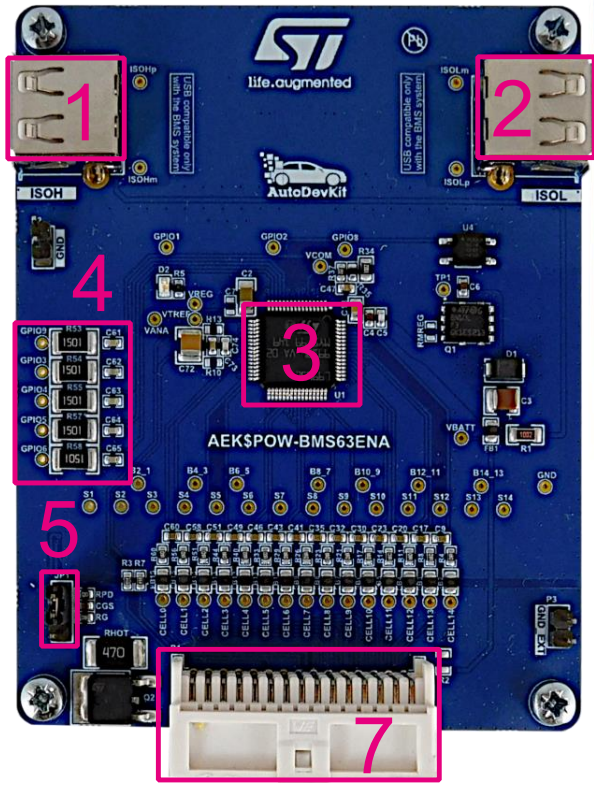
BMS systems protect the batteries from deep discharge and over-voltage, which are results of extreme fast charge and extreme high discharge current.



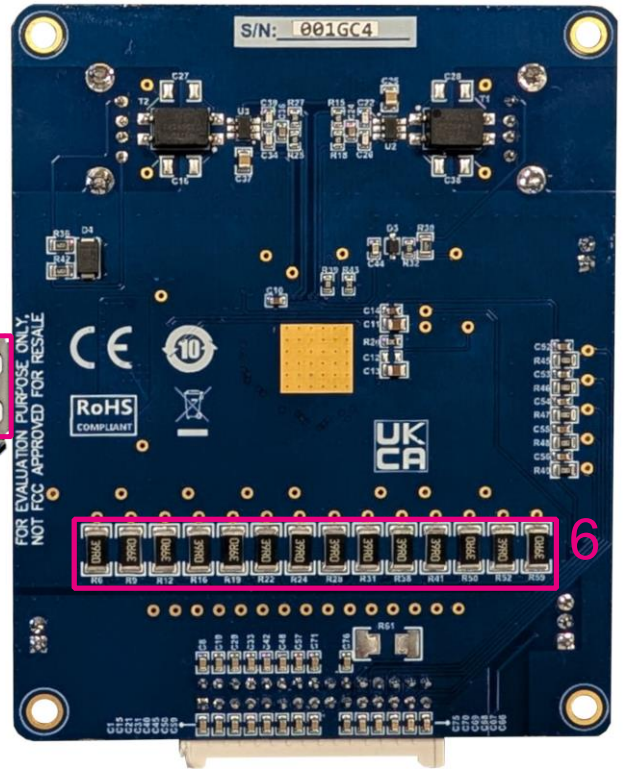
Block diagram of a BMS architecture

- The analog front-end (AFE) provides the temperature, and current readings from the battery to the MCU.
- Since the AFE is physically close to the battery, the AFE should also control the circuit breakers, which disconnect the battery from the rest of the system if any faults are triggered.
- The MCU receives the readings from the AFE. Then, it exploits complex cell modeling and advanced algorithms to estimate key parameters, such as the SoC and SoH.
- Communication between the MCU and the AFE is based on the ISOSPI protocol.

AEK-POW-BMS63EN



Top view



Bottom view

AEK-POW-BMS63EN is based on the L9963E (ASIL-D, AEC-Q1000 qualified device, compliant with ISO26262), which is designed for operation in both hybrid (HE) and full electric (BE) vehicles using lithium battery packs, but its use can be extended to other Transportation and Industrial applications.

AEK-POW-BMS63EN provides an elaborate monitoring network to sense the voltage of each cell, current of the series and 5 temperature values with NTC sensors. This sensing allows elaborating the SOC of each battery cell and, consequently, the state of charge of the battery pack. Using the SOC of each cell, it is possible to activate the cell passive balancing.

AEK-POW-BMS63EN is a battery management system (BMS) evaluation board that can manage from 4 to 14 battery series cells, with a maximum voltage value equal to 4.2V.
A daisy chain topology can handle from 1 to 31 Li-ion battery nodes.

AEK-POW-BMS63EN communicates through an MCU board with one (for the centralized configuration) or two (for the dual access ring configuration) AEK-COM-ISOSPI1 (based on L9963T), which allows converting SPI signals in isolated SPI signals (and vice versa), thereby reducing the number of necessary wires from 4 to 2 and implementing differential communication for higher noise immunity.

1. *ISOH port to connect the board to the AEK-COM-ISOSPI1*
2. *ISOL port to connect the board to another AEK-POW-BMS63EN in a daisy chain*
3. *L9963E*
4. *GPIOs for external NTC connection*
5. *Hot plug protection*
6. *Balancing resistors*
7. *Connector for the battery pack*

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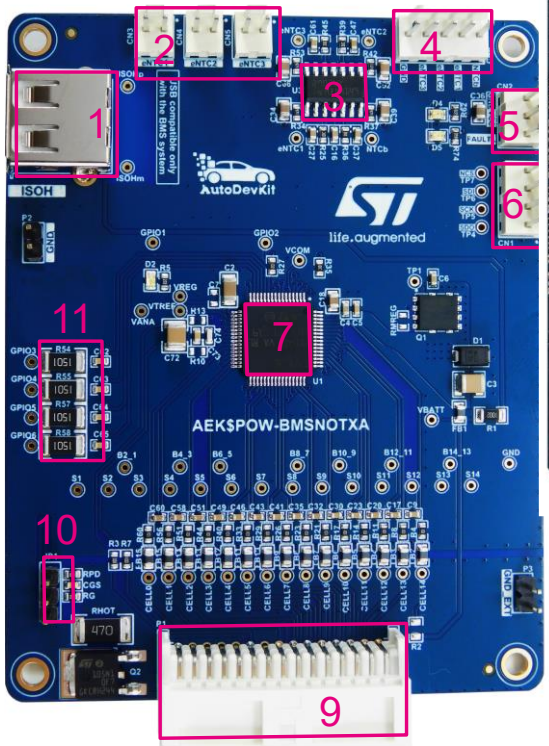
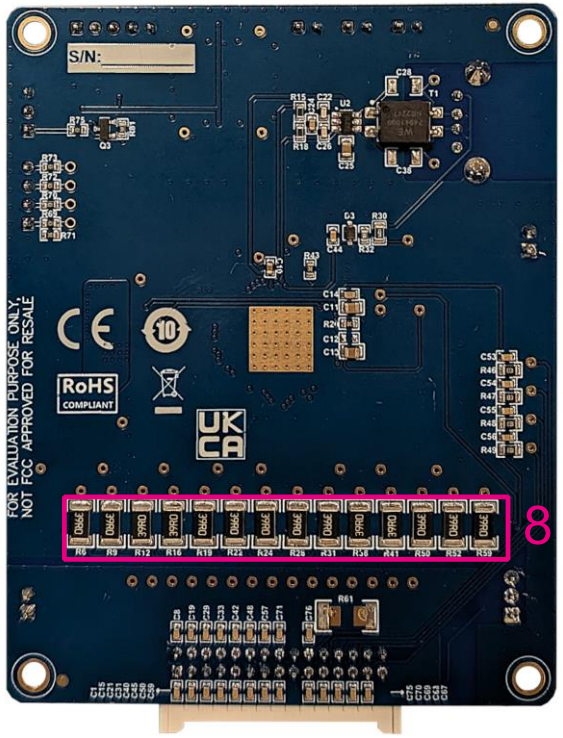
AEK-POW-BMSNOTX



Top view



Bottom view

AEK-POW-BMSNOTX is a non-isolated battery management system (BMS) evaluation board that manages from 4 to 14 battery cells. As it is based on non-isolated communication, this board is fit for low-voltage applications.

AEK-POW-BMSNOTX embeds the L9963E Li-ion battery monitoring and protection chip for high-reliability automotive applications, which can act as a transceiver, directly communicating with an MCU via SPI.

AEK-POW-BMSNOTX perfectly fits in auxiliary battery systems to supply power for devices (such as audio system, window cleaning system, seat heating, light system, light signalization, climate control system) connected to your vehicle (even when the engine is not running), ensuring the main starting battery is reserved for engine cranking and vehicle electrical requirements.

1. *ISOH port to connect the board to an AEK-POW-BMS63EN in a daisy chain*
2. *CN3, CN4 and CN5 connectors to connect three external NTC sensors*
3. *LM2902W Low power quad operational amplifier*
4. *CN6 connector for MCU ADCs dedicated to the NTC sensors reading*
5. *CN2 connector for diagnostic functions*
6. *CN1 connector to communicate with an MCU board via SPI*
7. *L9963E AEC-Q100 qualified automotive multicell battery monitoring and balancing IC*
8. *Balancing resistors*
9. *Connector for the battery pack*
10. *Hot plug protection*
11. *GPIOs for external NTC connection handled by L9963E*

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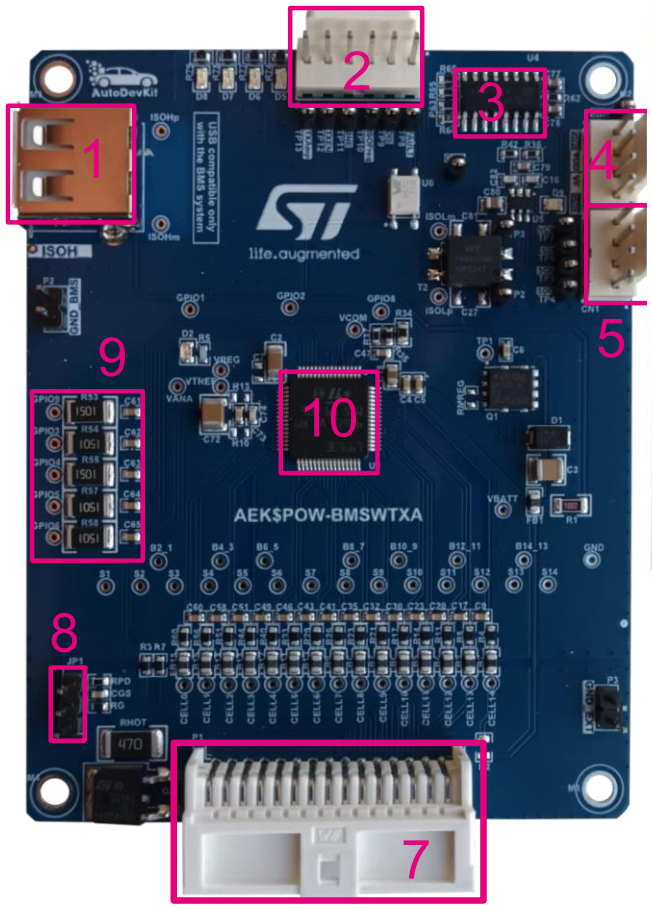
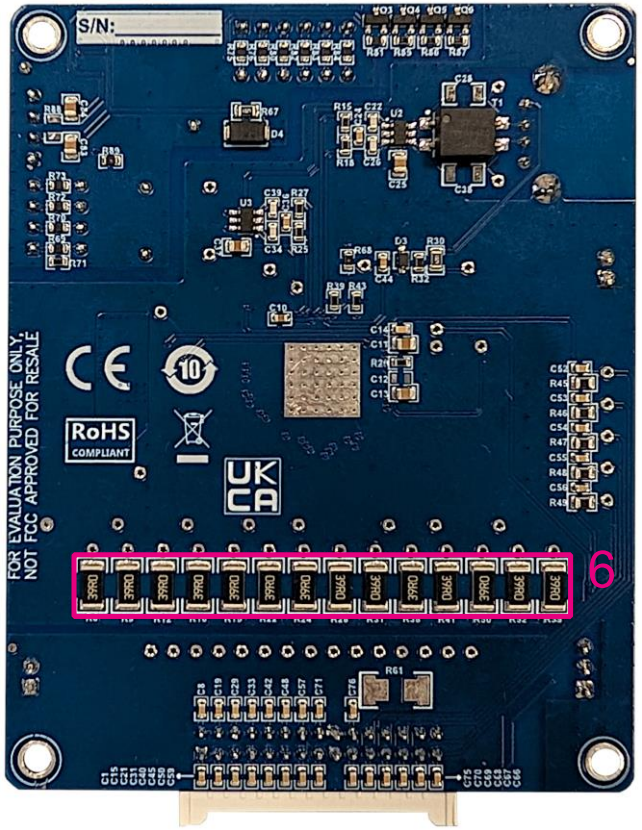
AEK-POW-BMSWTX



Top view



Bottom view

AEK-POW-BMSWTX hosts the L9963E AEC-Q100 qualified automotive multicell battery monitoring and balancing IC and the L9963T AEC-Q100 qualified automotive general-purpose SPI to isolated SPI bidirectional transceiver.

The board monitors voltage of every single cell and of the entire battery node plus current sensing of the entire battery node. It also features 5 GPIOs to connect temperature sensors as NTCs.

The AEK-POW-BMSWTX ensures isolated connection to an external MCU, thanks to the embedded L9963T transceiver, without the need of using a dongle for ISOSPI communication.

1. *ISOH port to connect the board to an AEK-POW-BMS63EN in a daisy chain*
2. *Connector for MCU ADCs dedicated to the NTC sensors reading*
3. Automotive general-purpose SPI to isolated SPI transceiver
4. *CN2 connector for diagnostic functions*
5. *CN1 connector to communicate with an MCU board via SPI*
6. *Balancing resistors*
7. *Connector for the battery pack*
8. *Hot plug protection*
9. *GPIOs for external NTC connection handled by L9963E*
10. *L9963E AEC-Q100 qualified automotive multicell battery monitoring and balancing IC*

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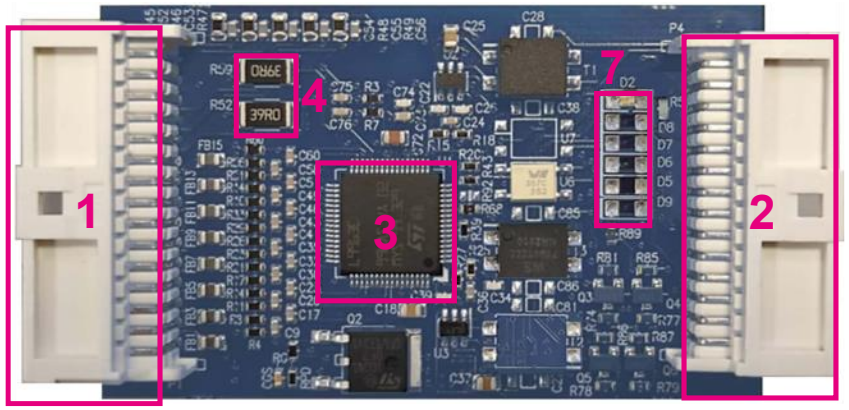
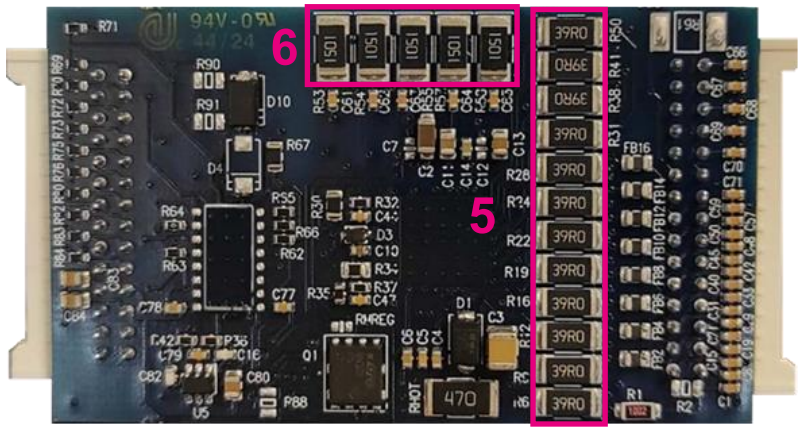
AEK-POW-BMSCC



Top view



Bottom view

The AEK-POW-BMSCC can be used in a centralized daisy chain as an intermediate node, where the first node is an AEK-POW-BMSCCTX. It can be part of a chain of up to 31 BMS nodes. Each battery node manages from 4 to 14 battery cells. The total voltage of the chain may range from 48 to 800 V.

The board can handle from 1 to 31 BMS nodes. Each battery node manages from 4 to 14 battery cells. The total voltage of the chain may range between 48 and 800 V.

The ability to easily integrate into a system, compact dimensions, and a wide range of applications make this compact BMS system ideal for any solution enhancing battery life, efficiency, and cost effectiveness during use and operation.

1. P1 connector for the battery pack with:
– 14 x cell connection
– 5 x L9963E dedicated ADC pins for NTC sensors reading
2. P4 connector to: – Communicate with the previous/next BMS node via ISOSPI – Receive and Redirect FAULT for diagnostic
3. L9963E AEC-Q100 qualified automotive multicell battery monitoring and balancing IC
4. Balancing resistors (Cell 1, Cell 2)
5. Balancing resistors (Cell 3 to Cell 14)
6. Voltage dividers for external NTC connection, handled by L9963E
7. LEDs used to display the operational status of the board. Each LED indicates different states and functions –
D2: ON when L9963E is configured and working
– D8: ON when TXEN is high (Transceiver ON)
– D7: blinks when the SPI communication with the MCU is established
– D6: ON when the transceiver is disabled
– D5: ON when a FAULT occurs
– D9: ON when VDD is high (MCU board ON)

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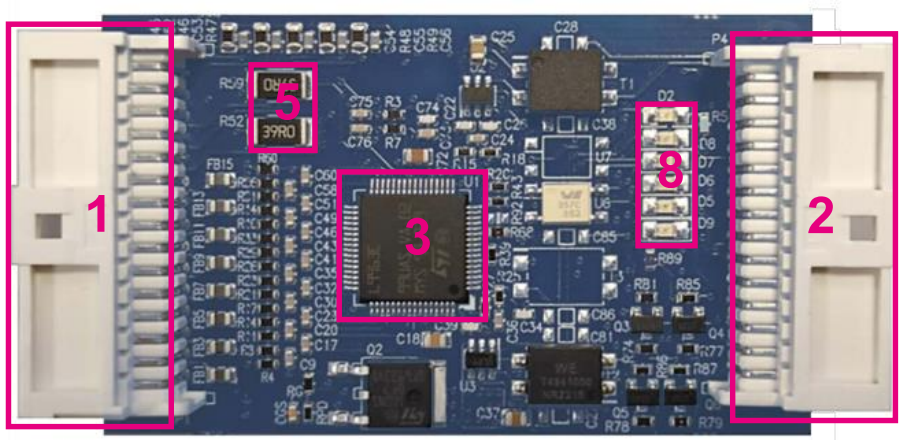
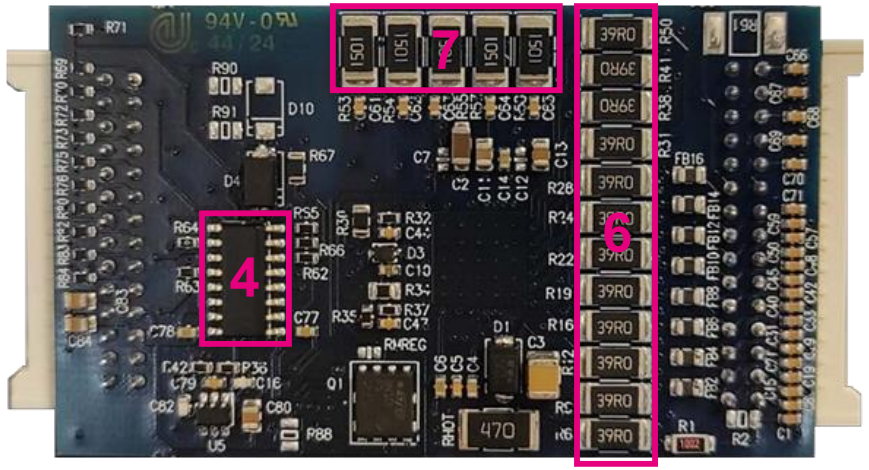
AEK-POW-BMSCCTX



Top view



Bottom view

The AEK-POW-BMSCCTX hosts the L9963E AEC-Q100 qualified automotive multicell battery monitoring and balancing IC and the L9963T AEC-Q100 qualified automotive general-purpose SPI to isolated SPI bidirectional transceiver.

The board embeds the L9963T Li-ion battery monitoring and protection chip for high-reliability automotive applications, which can act as a transceiver, directly communicating with an MCU via SPI.

The AEK-POW-BMSCCTX main advantage is ensuring isolated connection to an external MCU, thanks to the embedded transceiver. The small size allows for greater flexibility in battery pack installation, addressing the challenges of using a BMS in confined spaces.

1. P1 Connector for the battery pack with:
– 14 x cell connection
– 5 x L9963E dedicated ADC pins for NTC sensors reading
2. P4 connector to: – Communicate with an MCU board via SPI – Configure an AEK-POW-BMSCC node via ISO line in a daisy chain – Receive and Redirect FAULT for diagnostic
3. L9963E AEC-Q100 qualified automotive multicell battery monitoring and balancing IC
4. L9963T automotive general-purpose SPI to isolated SPI transceiver
5. Balancing resistors (Cell 1, Cell 2)
6. Balancing resistors (Cell 3 to Cell 14)
7. Voltage dividers for external NTC connection, handled by L9963E
8. LEDs used to display the operational status of the board. Each LED indicates different states and functions
– D2: ON when L9963E is configured and working
– D8: ON when TXEN is high (Transceiver ON)
– D7: blinks when the SPI communication with the MCU is established
– D6: ON when the transceiver is disabled – D5: ON when a FAULT occurs
– D9: ON when VDD is high (MCU board ON)

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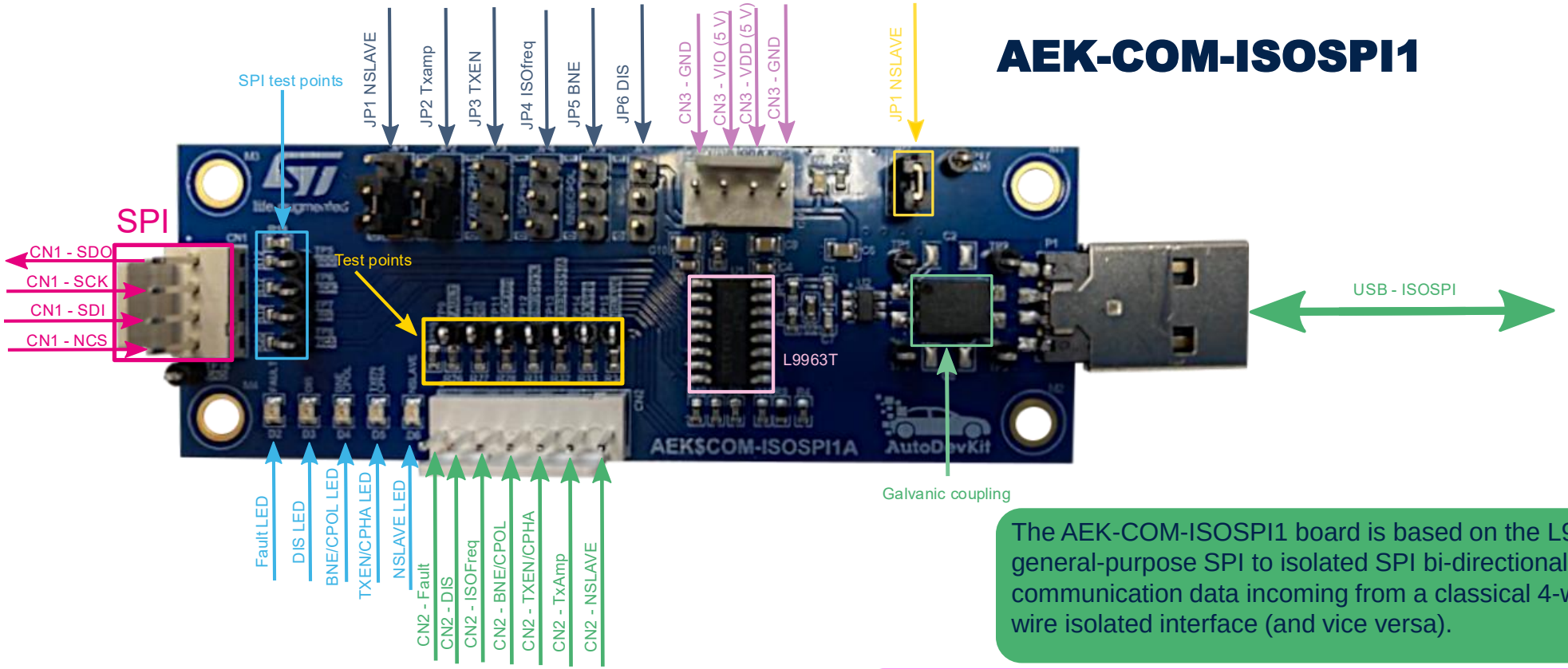
AEK-COM-ISOSPI1



The AEK-COM-ISOSPI1 board is based on the L9963T integrated circuit, a general-purpose SPI to isolated SPI bi-directional transceiver, which can transfer communication data incoming from a classical 4-wire based SPI interface to a 2-wire isolated interface (and vice versa).

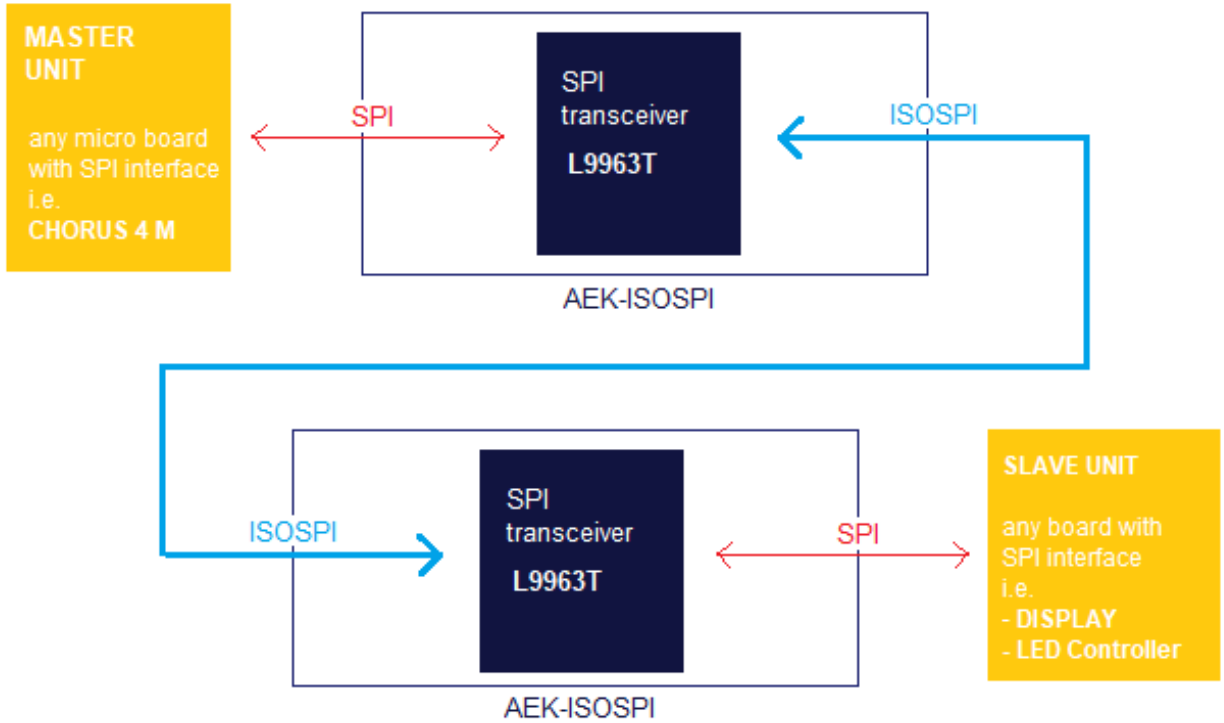
The L9963T hosted on the AEK-COM-ISOSPI1 can be configured either as a slave or as a master of the SPI bus and supports any protocol of 8-to-64-bit SPI frames. The SPI peripheral can work up to 10 MHz when configured as a slave. The SPI clock frequency can be programmed (250 kHz, 1 MHz, 4 MHz, or 8 MHz) when the device is configured as a master.

The transceiver is natively compatible with the L9963E IC isolated SPI port, allowing its usage in battery management system (BMS) applications. The basic BMS analog front-end node board is the AEK-POW-BMS63EN. From the microcontroller side, the AEK-COM-ISOSPI1 board can be connected via SPI with SPC5, Stellar and STM32 microcontroller families.

AEK-COM-ISOSPI1 for ISOSPI communication

- The AEK-COM-ISOSPI1 board allows converting SPI signals into ISOSPI signals, reducing the number of necessary wires from 4 to 2, and ensuring an isolated differential communication highly immune to noise as well as robustness for long distance communication.

- As an ISOSPI signal can travel for several meters, this protocol is particularly suitable for automotive high voltage applications where electrical isolation is required by the safety standards and the cable length can affect the communication among devices located in distant parts of the vehicle.



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AEK-POW-BMSHOLD

The AEK-POW-BMSHOLD helps you create a battery pack to evaluate ST BMS solutions This battery holder contains a maximum of 14 cells, all connected in series, and a dedicated slot and connector for our BMS evaluation boards.

To build a complete battery pack, you can stack up to three/four AEK-POW-BSMHOLD kits using the screws and the hexagonal steel spacers included in the package.

The AEK-POW-BMSHOLD has a long satin ribbon tied to a buttonhole on the plexiglass used to support easy battery removal. The internal wiring of the featured 4-pole mammoth connector allows adding a sensing resistor between pin 2 and pin 3. For demo purposes, a 100 mΩ, 10 W, ±1% precision resistor is included in the kit package.

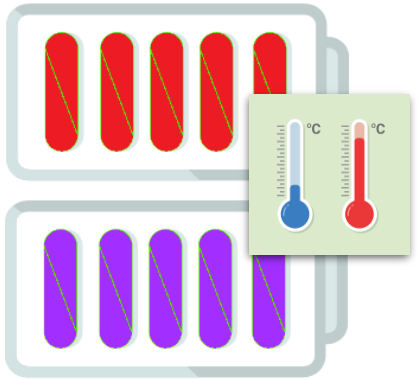
Refer to DB5082 , section 2, for detailed information on how to use this battery holder

Safety and diagnostic features

The main IC (L9963E) included in our BMS evaluation boards provides an extended set of safety mechanisms to comply with the ASIL standard. It monitors potentially damaging conditions for the battery pack.

SOC ESTIMATION

- **Cell Under/Over Voltage Detection** (custom thresholds)
- **Battery Pack Under/Over Voltage Detection** (custom thresholds)



- **GPIO Under/Over Temperature** Detection (custom thresholds)
- **Fast Charge GPIO Under/Over Temperature Detection ***
- **GPIO Open/Short Fault**

**This detection provides an additional OT threshold to make the MCU switch from fast charge (high DC current) to low power charge.

- **Current Sense Over Current** (custom thresholds)
- **Current Sense Open Diagnostic**

- **Cell Open Wire diagnostic**
- **PCB Cell Open diagnostic**
- **Chip Over Temperature**
- **Balancing Open Diagnostic**
- **Balancing Short Load Diagnostic**
- **Voltage Regulator OV/UV diagnostic**
- **Communication Integrity**
- **Communication loss detection**
- **GND loss detection**

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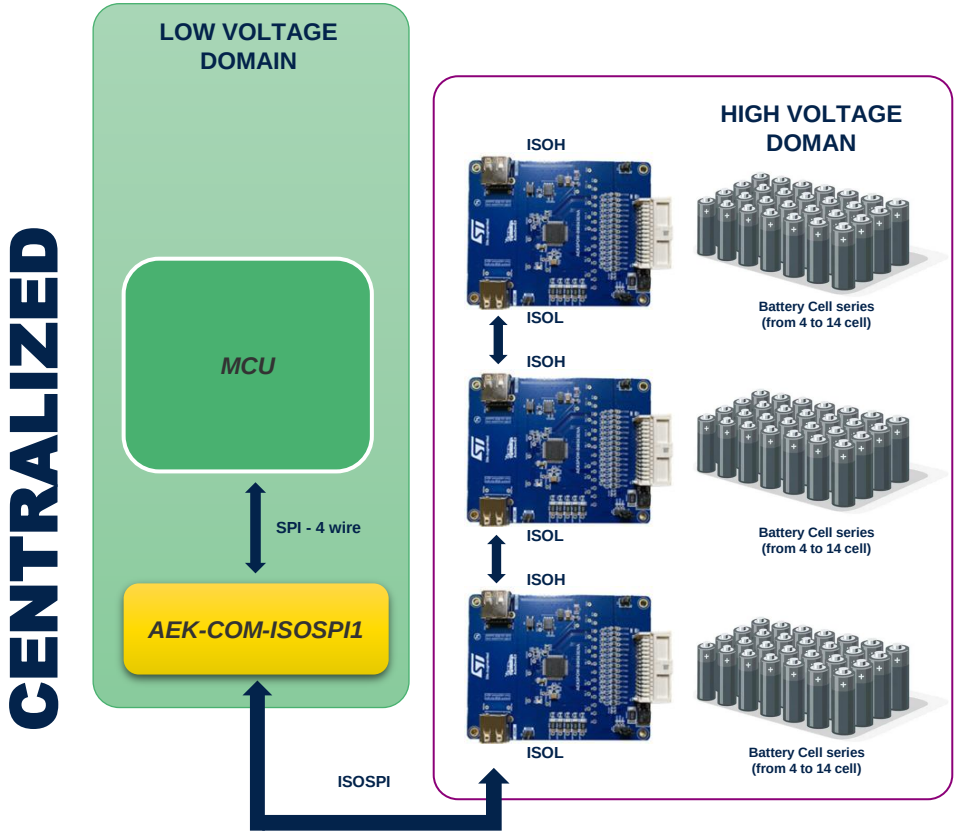
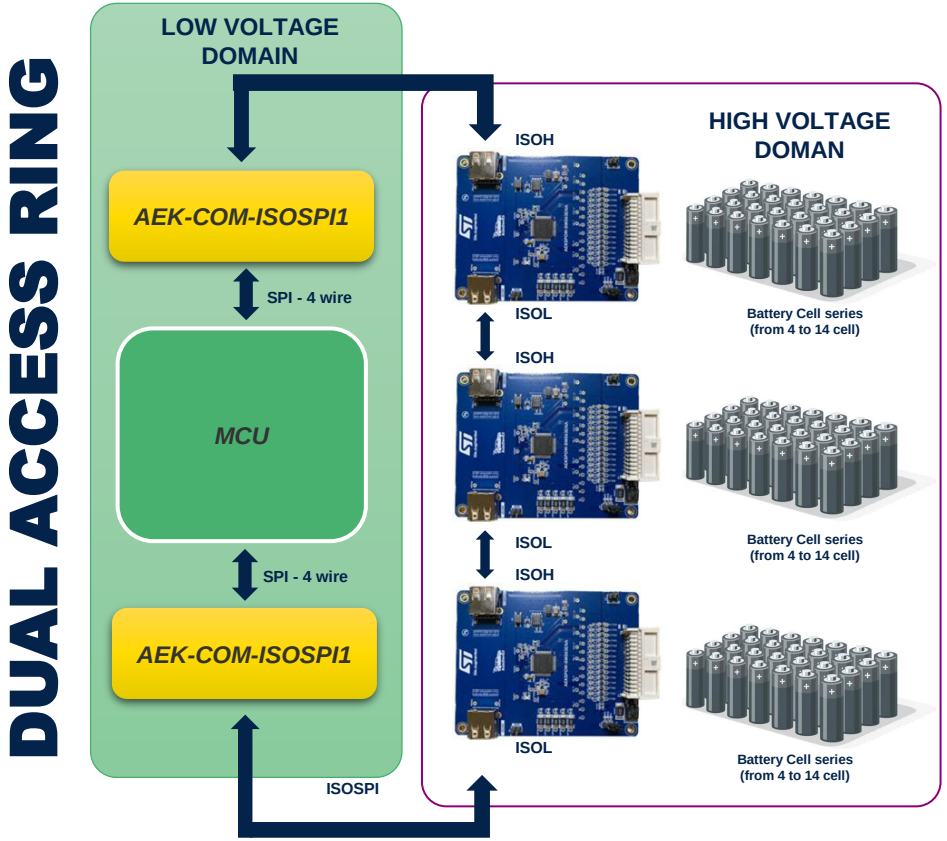
The AEK-POW-BMS63EN can work in two different daisy chain topologies: centralized and dual access ring.



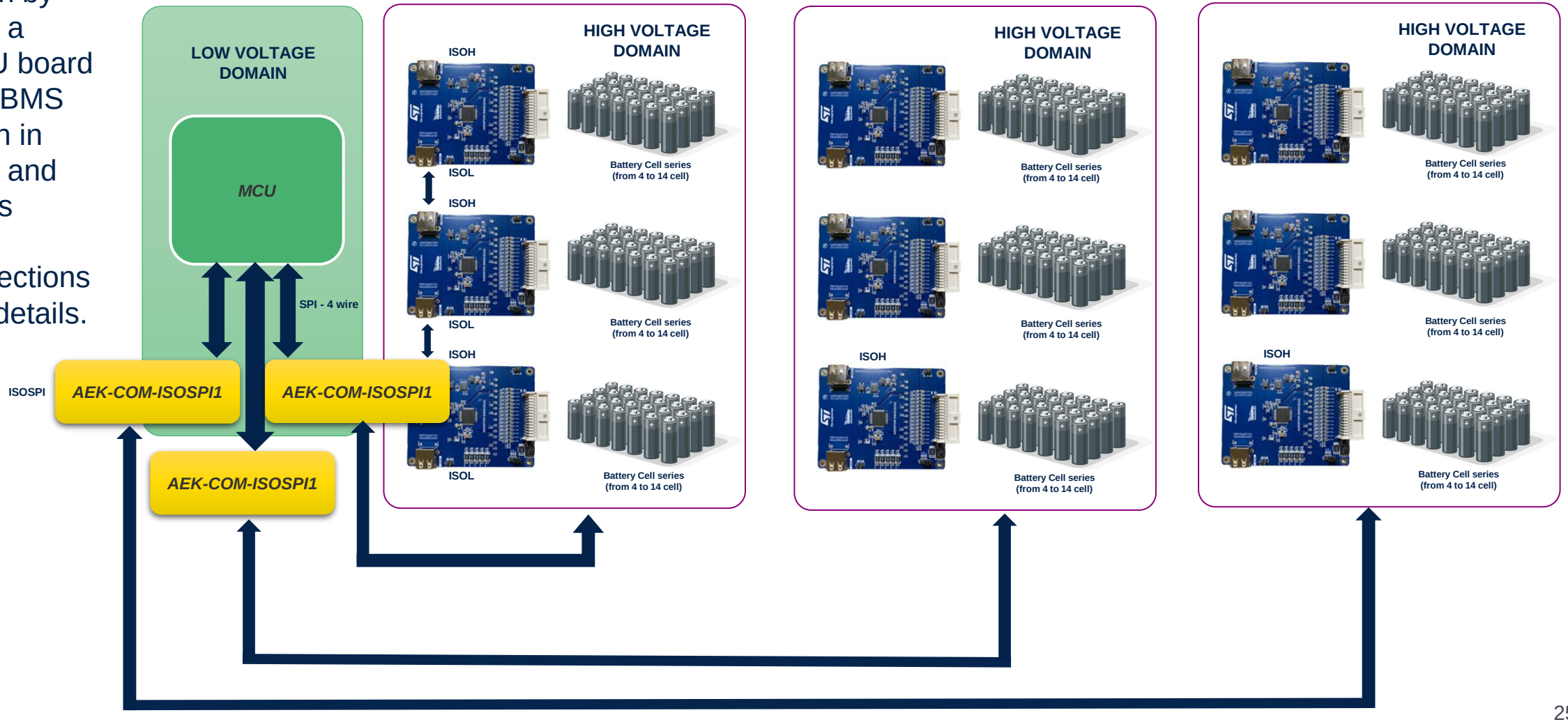
In a centralized daisy chain configuration, a series of BMS is connected to an MCU board through a single transceiver connected to the AEK-POW-BMS63EN isolated ISOL port. The BMS are connected to each other through the isolated ISOH port.



A dual access ring configuration is also possible by adding another transceiver that makes the communication bidirectional. The secondary ring is used as a backup in case the primary ring fails. Data moves in opposite directions around the rings, and each ring remains independent of the other unless the primary ring fails.

Example of centralized topology using AEK-POW-BMS63EN in multichain configuration

You can also build a multichain by connecting a single MCU board to multiple BMS nodes, both in centralized and dual access topologies.
See next sections for further details.



A comprehensive development ecosystem is available

Resource	Links
Datasheet L9963E and L9963T	LINK LINK
AEK-POW-BMSHOLD product page	LINK
AEK-POW-BMS63EN product page	LINK
AEK-COM-ISOSPI1 product page	LINK
AEK-POW-BMSNOTX product page	LINK
AEK-POW-BMSWTX product page	LINK
AEK-POW-BMSLV product page	LINK
AEK-POW-BMSCC product page	LINK
AEK-POW-BMSCCTX product page	LINK
AutoDevKit Studio download page	LINK
Blog page	LINK LINK (Chinese)
Video	LINK LINK LINK LINK LINK
BeonD partner for custom battery pack design and engineering	LINK
About:Energy contact page for custom battery chemistry	LINK
Example of code for STM32 from Polytechnic of Turin (Italy) Squadra Corse	LINK

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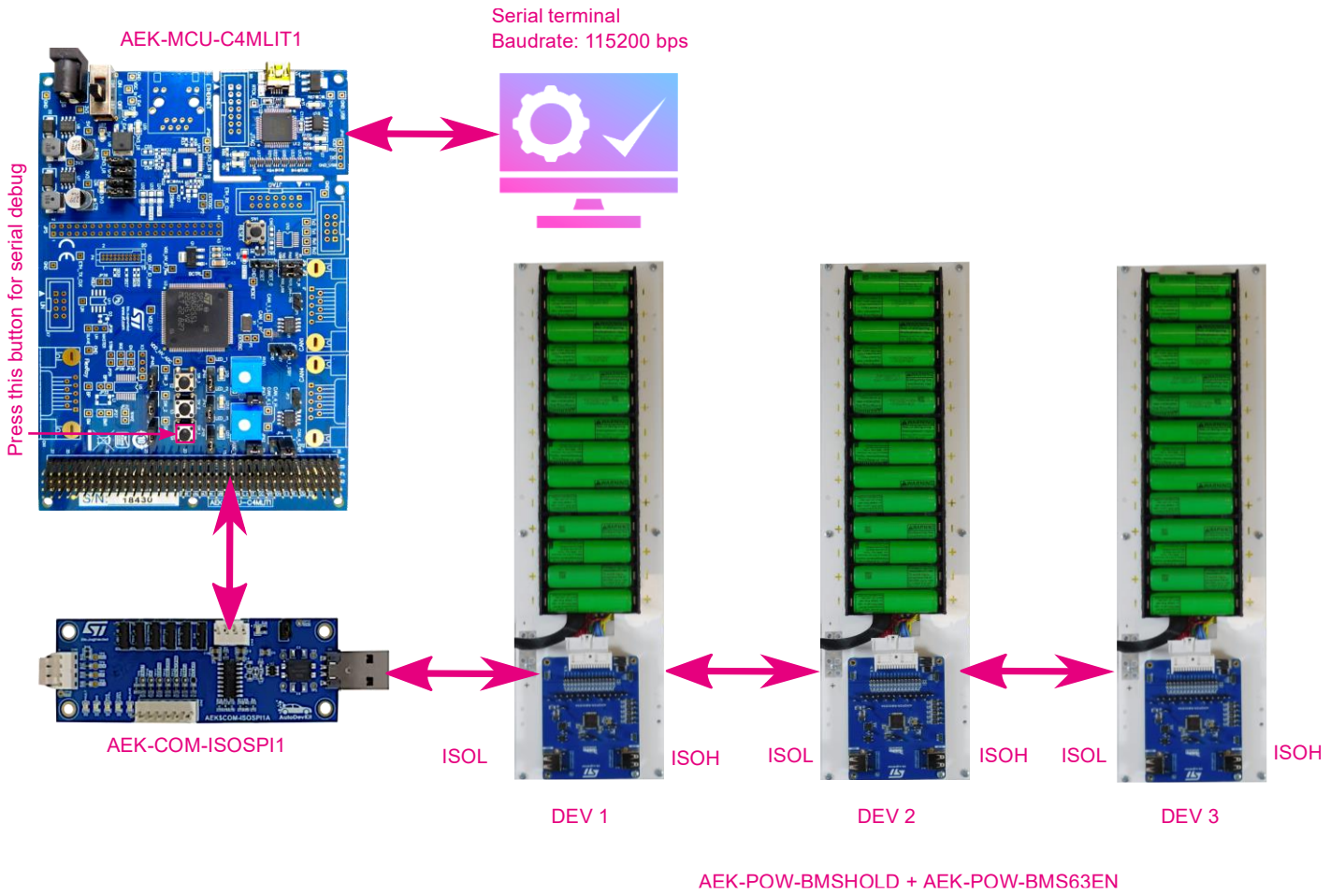
HW and SW configurations

Example of centralized topology using AEK-POW-BMS63EN

- Set the system up as shown below for the centralized topology:



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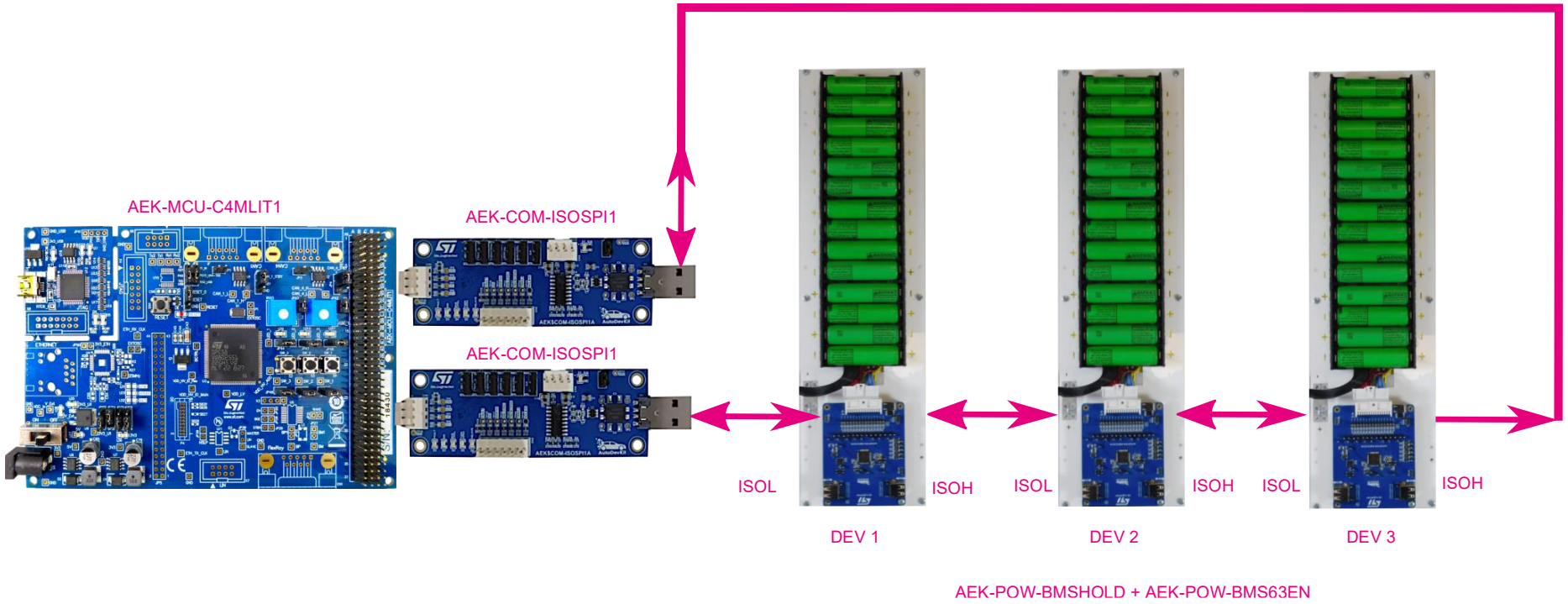
Example of dual access ring topology using AEK-POW-BMS63EN

- Set the system up as shown below for the dual access ring topology:



Note: You can use the other BMS boards belonging to our portfolio to build your system topology, considering that the first node of the chain can be either an AEK-POW-BMS63EN, an AEK-POW-BMSWTX or an AEK-POW-BMSNOTX. All the other chain nodes must be AEK-POW-BMS63EN.

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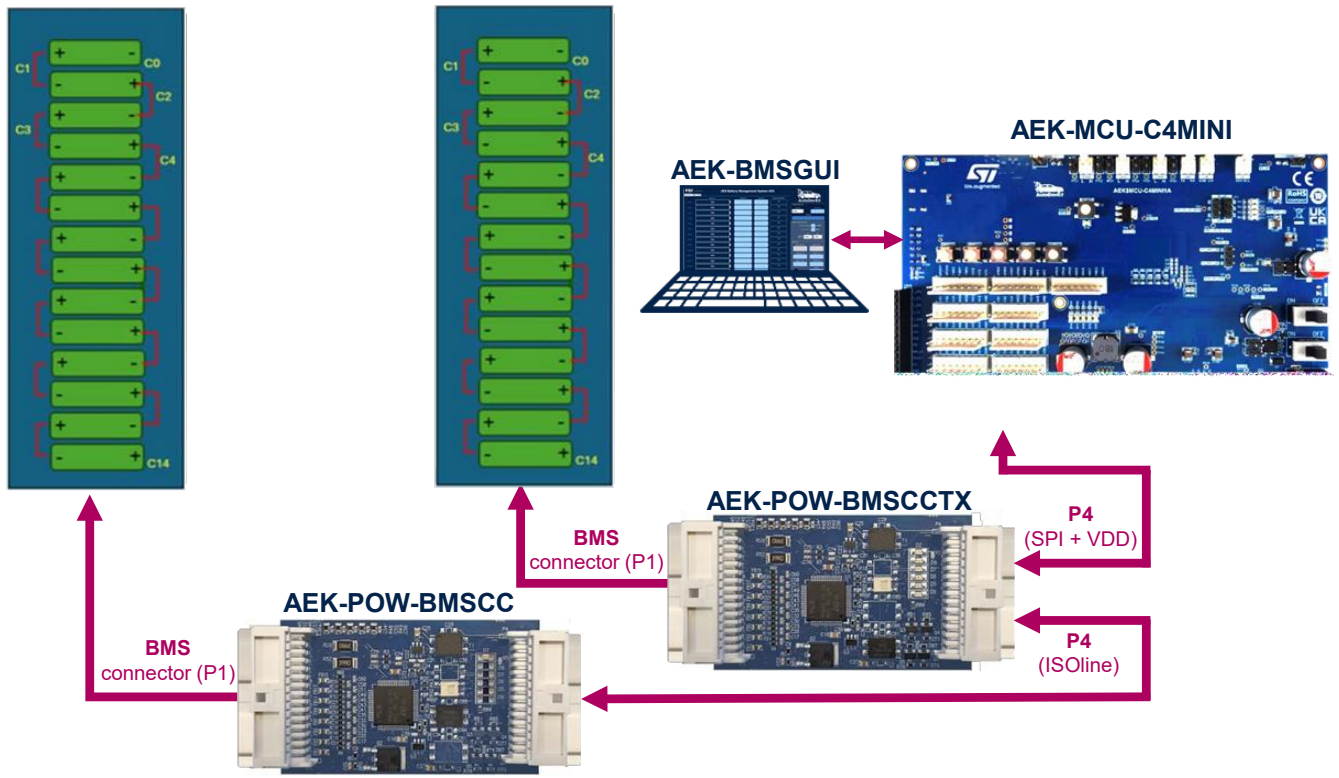
Daisy chain configuration for AEK-POW-BMCC and AEK-POWBMSCCTX (1 of 3)

- To connect the two boards in a daisy chain configuration, using the AEK-MCU-C4MINI1 as MCU and two battery holders (for example, AEK-POW-BMSHOLD), refer to the image below.



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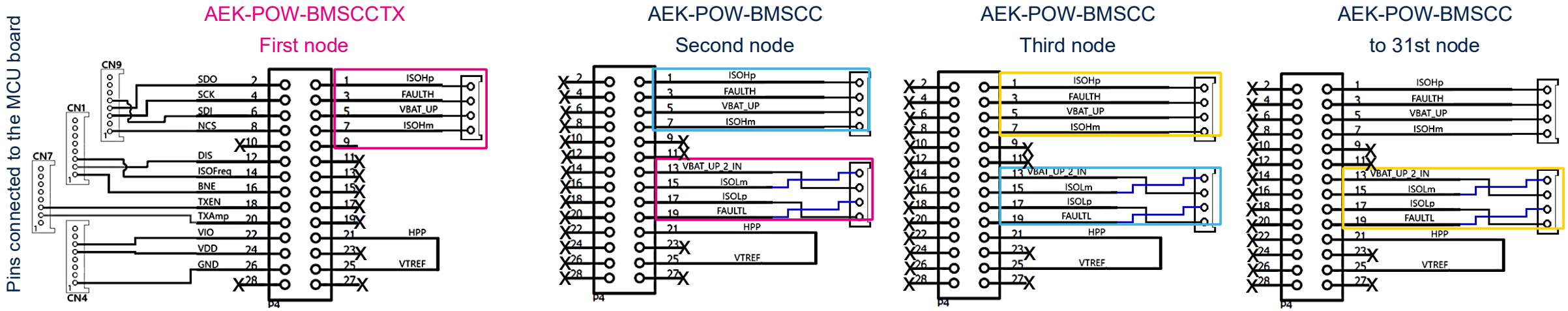
Daisy chain configuration for AEK-POW-BMCC and AEK-POWBMSCCTX (2 of 3)

- Refer to P4 board connector pinout shown below to link the chain nodes.

  In detail, wire:

  - ISOHp of a node with ISOLm of the following node
  - FAULTH of a node with FAULTL of the following node
  - VBAT_UP of a node with VBAT_UP_2_IN of the following node
  - ISOHm of a node with ISOLp of the following node



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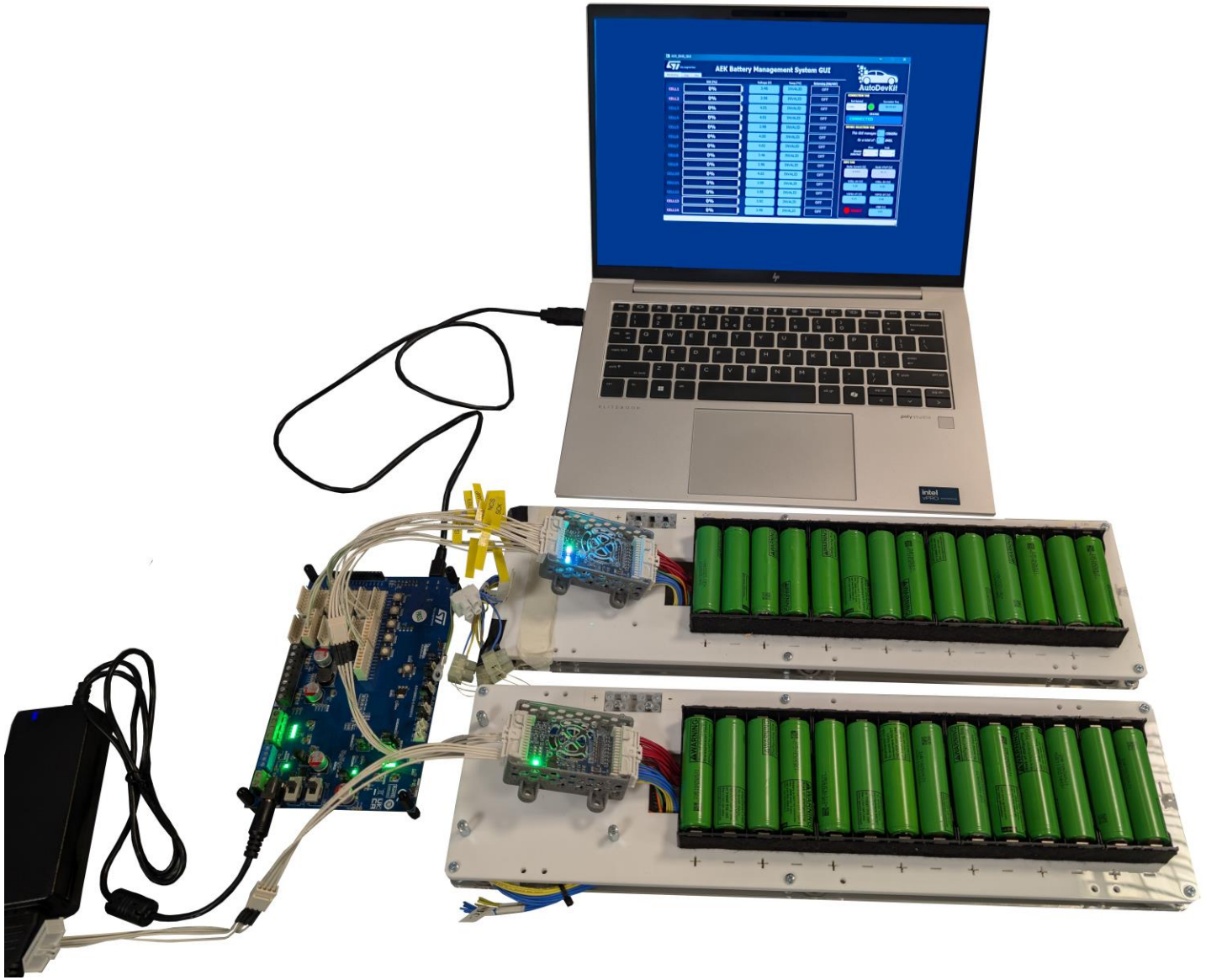
Daisy chain configuration for AEK-POW-BMCC and AEK-POWBMSCCTX (3 of 3)



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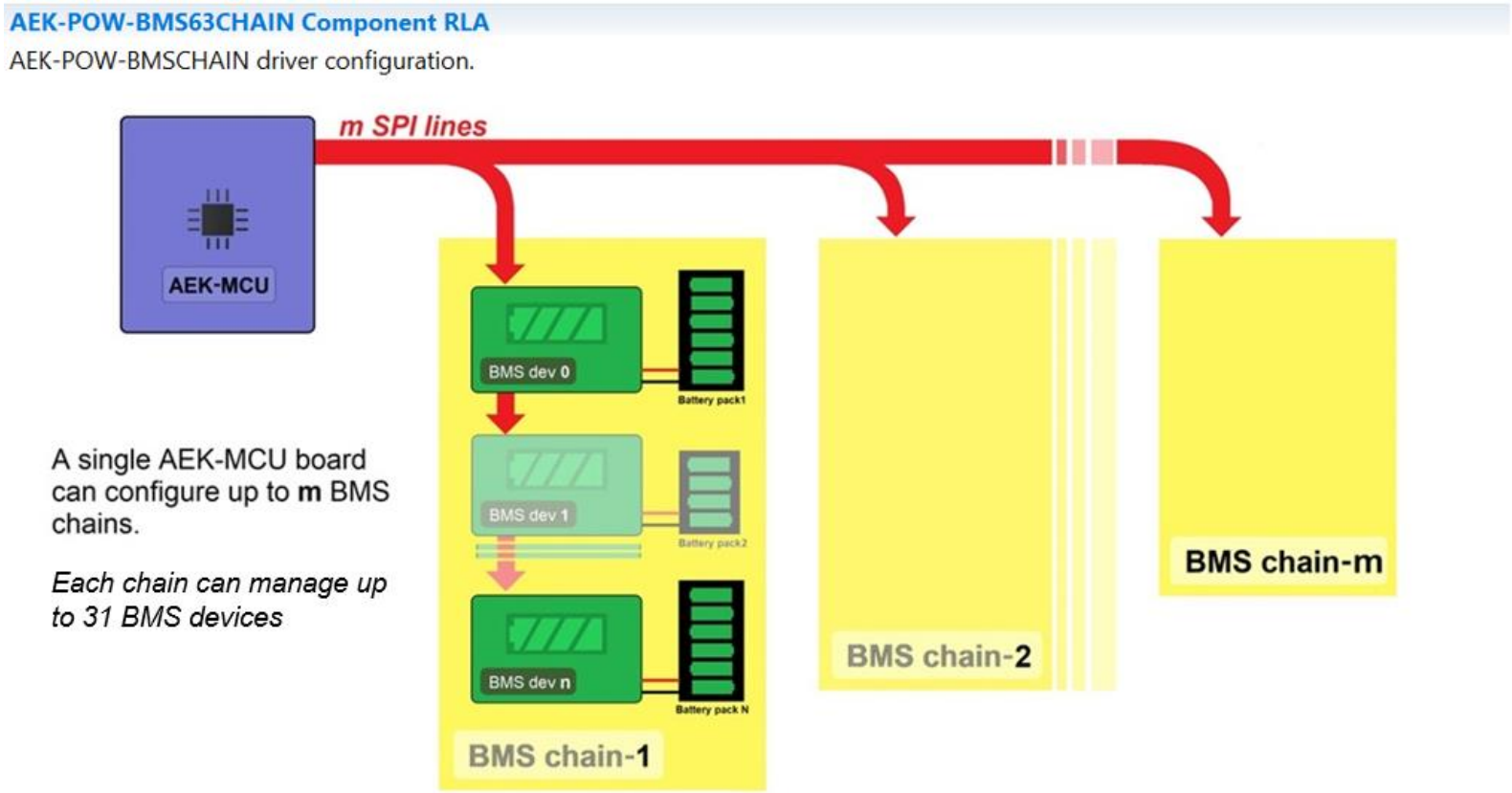
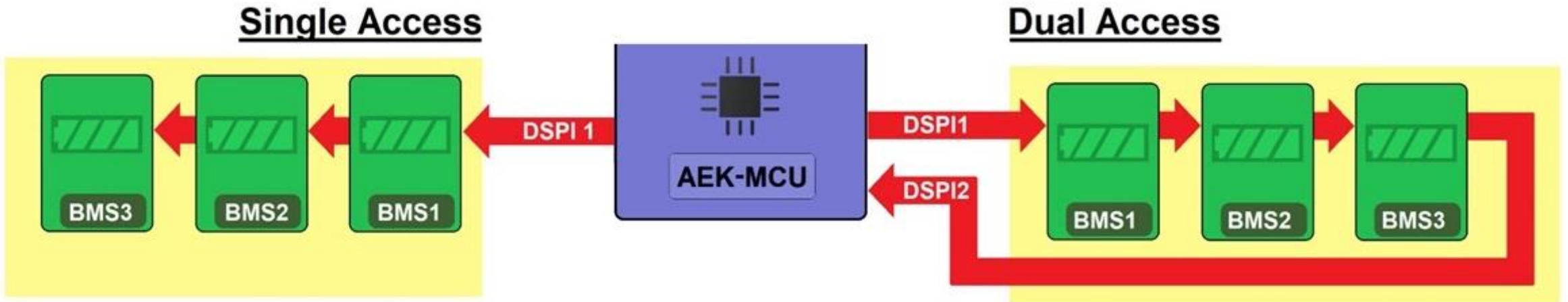
AutoDevKit example (1 of 3)

- Install AEKStudio and recreate the scenario for a centralized configuration or a dual access ring configuration.
- Follow the procedure described in UM3185 to import the AEK-POW-BMSCHAIN component and configure it according to your needs. You can choose the number of chains to be managed by the BMS.



AutoDevKit example (2 of 3)

- Define your chain configuration (single or dual access).



In **Single access** just one DSPI line is allocated. This way the MCU communicates with the first device of the **Chain** which broadcasts the message to the next BMS of the Stack, iteratively.

In **Dual Access** 2 DSPI lines are allocated. The MCU may then follow one of the two paths to communicate with the stack. (*This configuration is more robust against middle nodes faults.)*

AutoDevKit example (3 of 3)

- Select the Boards to be included in the chain, according to the rules of the table below.

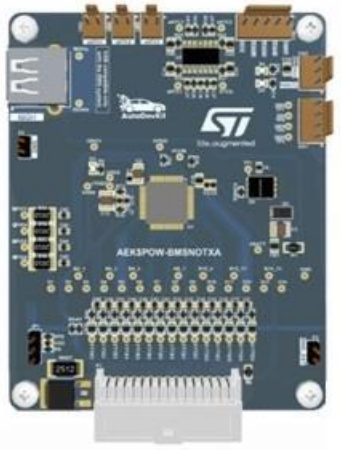
AEK-POW-BMS63EN

AEK-COM-ISOSPI

Warning: The configuration with the AEK_COM_ISOSPI is referred to the **first element of the Stack.**

AEK-POW-BMSWTX

AEK-POW-BMSNOTX



Position in the Stack	*BMS nodes*
First Node	• AEK_POW_BMS63EN + AEK_COM_ISOSPI • AEK_POW_BMSWTX • AEK_POW_BMSNOTX • AEK_POW_BMSCCTX
Intermediate Node	• AEK_POW_BMS63EN • AEK_POW_BMSCC (if 1st node=AEK_POW_BMSCCTX)
Terminal Node	• AEK_POW_BMS63EN (+*AEK_COM_ISOSPI* for Dual Access) • AEK_POW_BMSCC (Dual Access **not supported**)

AEK-POW-BMSCC

AEK-POW-BMSCCTX

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AutoDevKit demos

In AutoDevKit, starting from release 2.4.0, there are several available demos for the AEK-POW-BMS63EN, AEK-POW-BMSNOTX and AEK-POW-BMSWTX, and, from release 2.6.1, also for the AEK-POW_BMSCC and AEK-POW-BMSCCTX, using different MCU boards (based on Chorus1M, Chorus2M, Chorus4M and Bernina).

.

- SPC58EC - AEK_POW_BMSWTX_SOC_Estimation application for discovery
- SPC58EC - AEK_POW_BMSWTX_SOC_Est_SingleAccess_CHAIN_GUI_application for discovery
- SPC58EC - AEK_POW_BMSWTX_SOC_Est_SingleAccess_CHAIN application for discovery
- SPC58EC - AEK_POW_BMSWTX_DualAccess_CHAIN application for discovery
- SPC58EC - AEK_POW_BMSNOTX_SOC_Est_SingleAccess_CHAIN_GUI_application for discovery
- SPC58EC - AEK_POW_BMSNOTX_SOC_Est_SingleAccess_CHAIN application for discovery
- SPC58EC - AEK_POW_BMSLV application for discovery
- SPC58EC - AEK_POW_BMS63EN_SOC_Estimation_Single application for discovery
- SPC58EC - AEK_POW_BMS63EN_SOC_Estimation_DualRing application for discovery
- SPC58EC - AEK_POW_BMS63EN_SOC_Estimation_Centralized application for discovery
- SPC58EC - AEK_POW_BMS63EN_SOC_Estimation_6Cells_GUI application for discovery
- SPC58EC - AEK_POW_BMS63EN_SOC_Estimation_14Cells_GUI application for discovery
- SPC58EC - AEK_POW_BMS63EN_SOC_Est_SingleAccess_CHAIN_GUI_application for discovery
- SPC58EC - AEK_POW_BMS63EN_SOC_Est_SingleAccess_CHAIN application for discovery
- SPC58EC - AEK_POW_BMS63EN Single 6 Cells application for discovery
- AEK-MCU-C4MINI - AEK_POW_BMSCCTX_GUI_application for discovery
- AEK-MCU-C4MINI - AEK_POW_BMSCCTX_2_nodes_chain_GUI_application for discovery

You can start from these demos to develop your own application, according to the microcontroller board used and to the type of topology chosen

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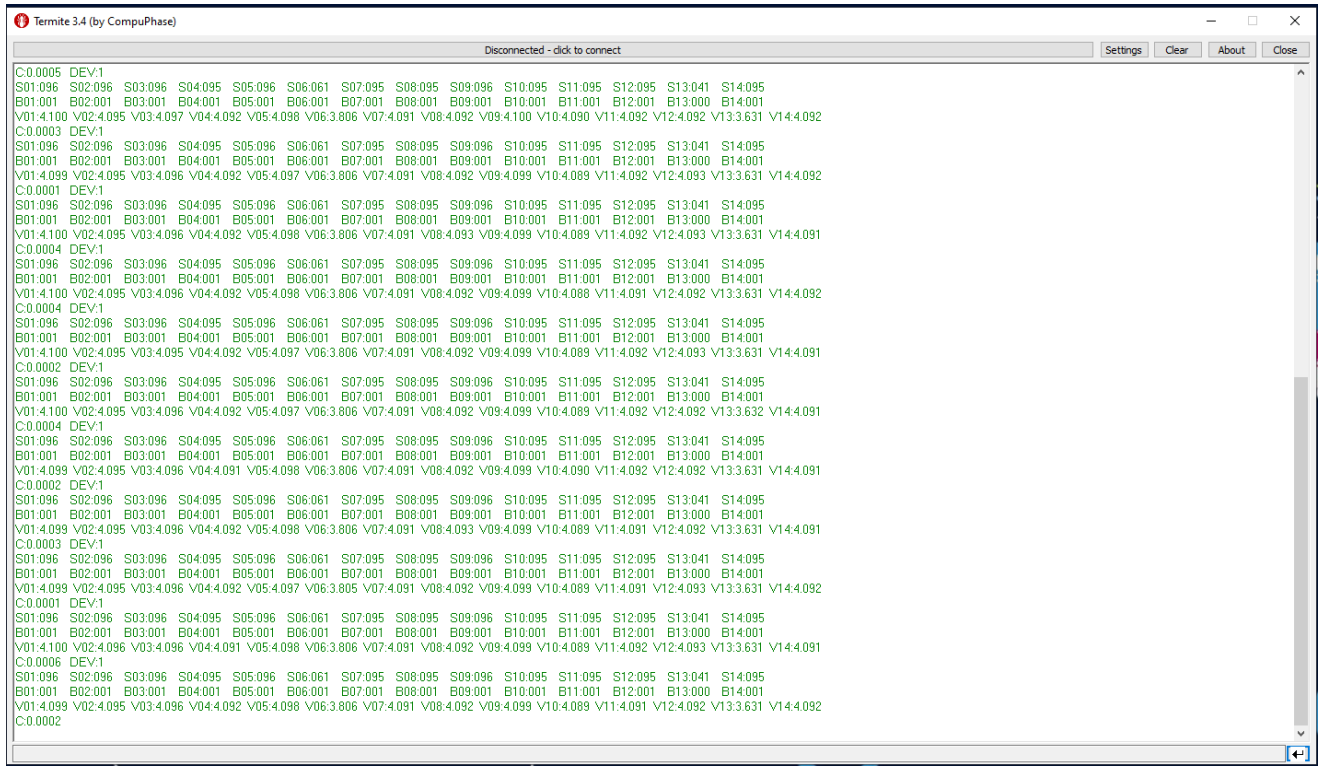
AutoDevKit New BMS CHAIN Driver new features

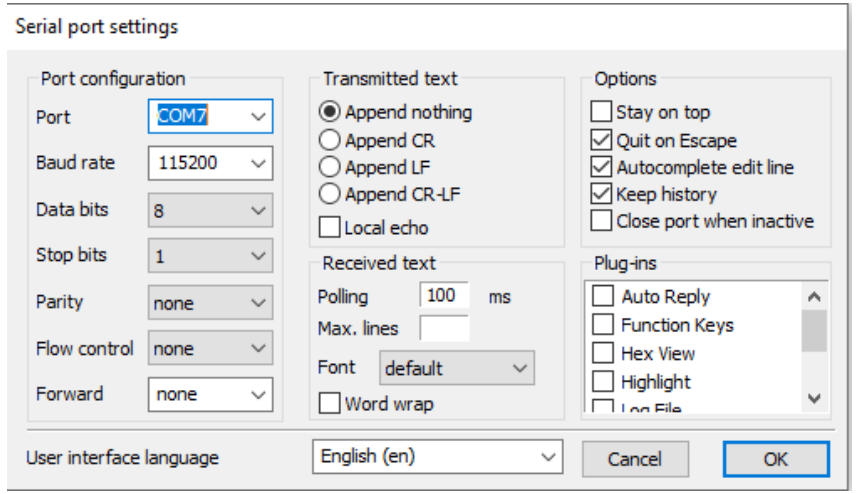
- **Cyclic mode available**: If this mode is activated with an initial command to the L9963E, the system will automatically respond, within a software defined time interval, with packets containing measures (Voltage, Current, Temperature) and diagnostic messages. If any fault is detected a Configuration Override state is reached and the system disables the Cyclic mode and goes to the “on demand” request mode. The fault remains latched until the “on demand” request is carried out.
- **Reduced total measurement time**: This has been achieved implementing the SPI Burst for send and receive messages. We are now able to acquire ALL measure and diagnostic messages in 7 msecs!
- **Hot plug connection / disconnection of a BMS node**: The code will keep running and working with the remaining accessible nodes.
- **Automatic activation of the dual ring communication in case of node access failure.**
- **Heterogeneous BMS node chains are now possible.**
- **Fixed CRC calculation routine.**
- **Fixed NTC voltage threshold fault management.**
- **Improved node addressing procedure**: The code will not remain stuck even if a pre-configured node is missing.
- **Each Chain and Node are C-like objects:** It is possible to insert and customize attributes.
- **Multi-MCU support available:** Chorus 1M SPC582B, Chorus 2M SPC584B, Chorus 4M SPC58EC and Bernina SPC58NX (for ASIL-D)

Displaying BMS data 1/2 – using a standard serial terminal

Use a serial terminal (for example, Termite), to print SOC, cell voltage, current, and balancing for a specific BMS of the chain (in this case, DEV:1).



Set the configuration parameters as shown below.



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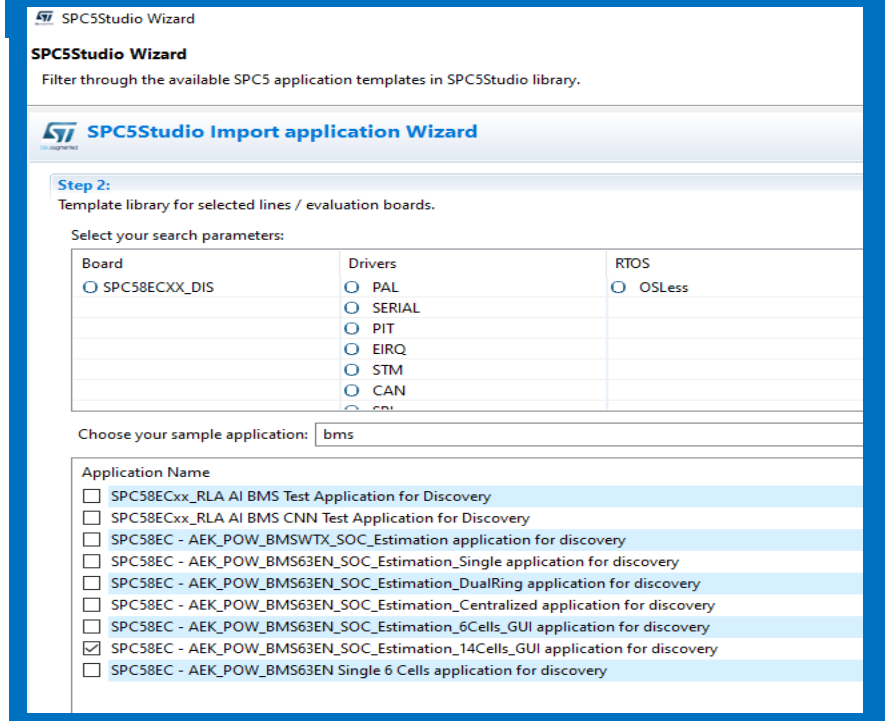
Displaying BMS data 2/2 – using the GUI

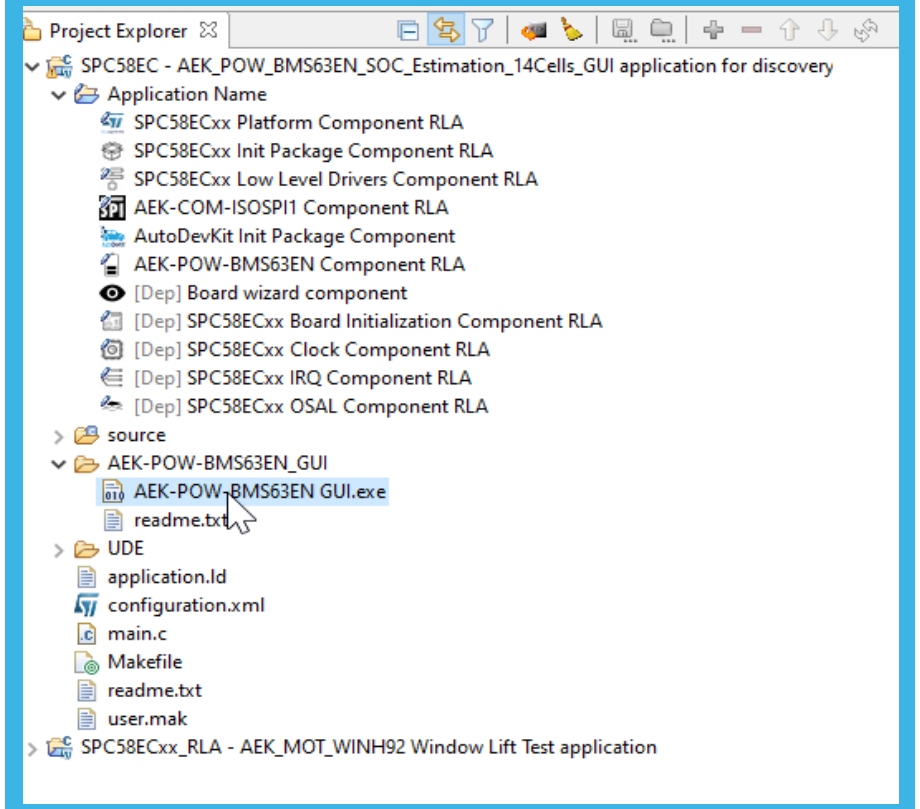
Set the configuration parameters as shown below.

Step 1. Import Demo:

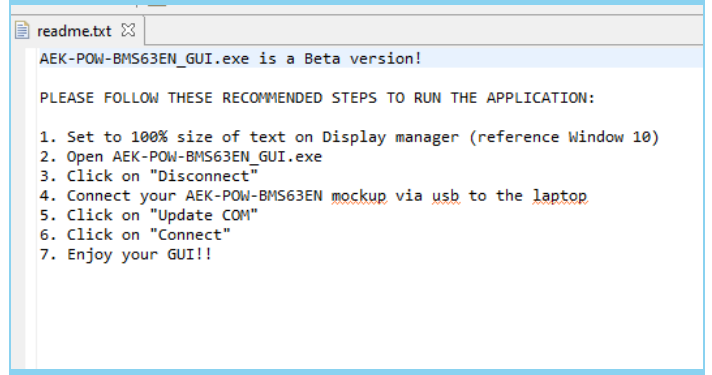
SPC58EC – AEK_POW_BMS63EN_SOC_Estimation_14Cells_GUI application for discovery



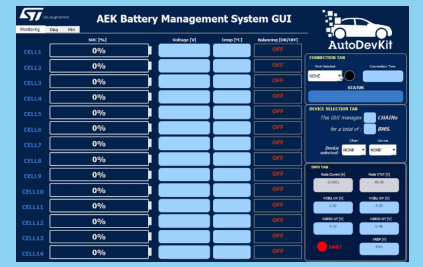
Step 2. Copy ***.exe*** file from project folder on the Desktop



Step 3. Read ***readme.txt*** instructions



Step 4. Run the GUI



For further info, refer to UM3185, Section 12. BMS GUI

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