Utilizing Chip-on-Cell Sensing for Better Battery Management

Intelligence on every cell

About Dukosi

Dukosi develops revolutionary technologies to dramatically improve the performance, safety and efficiency of battery systems.

Founded and headquartered in Edinburgh, UK

Pioneered contactless near-field communication for cell level battery monitoring

110

Employees

5

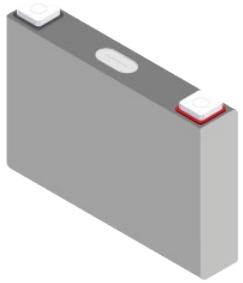
Global locations, close to customers

Partnered with Global Foundries & Amkor

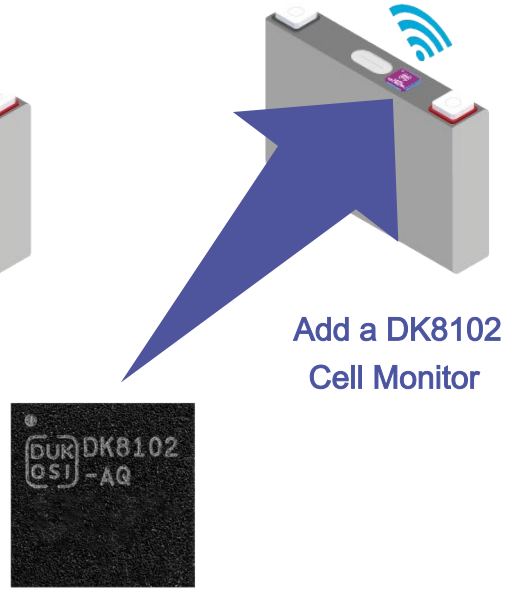
Enabling a sustainable battery supply chain

* Each submitted in multiple jurisdictions

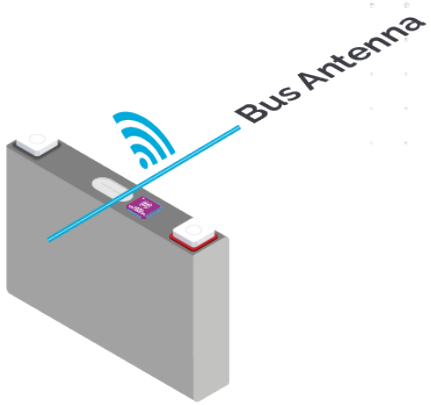
Architectural simplicity and scalability



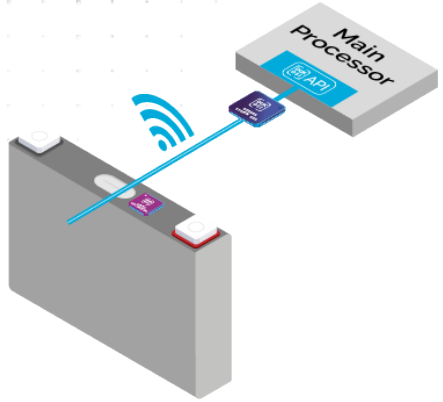
Take a cell



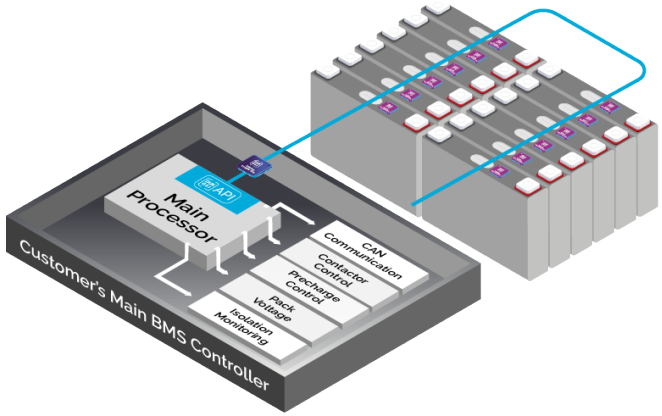
Add a DK8102
Cell Monitor



Add a near field
bus antenna



Connect to a Main BMS Controller
with a DK8202 System Hub



Add as many more cells as you need

- Plug & play
- Scalable in 1S increment
- Agnostic to chemistry & cell format

Chip-on-cell with C-SynQ® for optimal battery management

SIMPLER

> Eliminate wire harnesses and connectors

> Enable cell -to-pack

SAFER

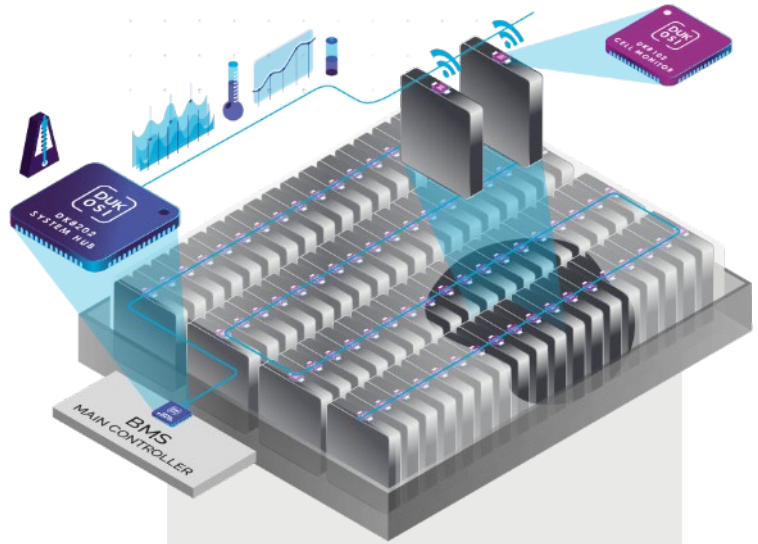
> Highest accuracy & data granularity

> Electrically isolated from high voltage domain

SMARTER

> Synchronous measurement of all cells

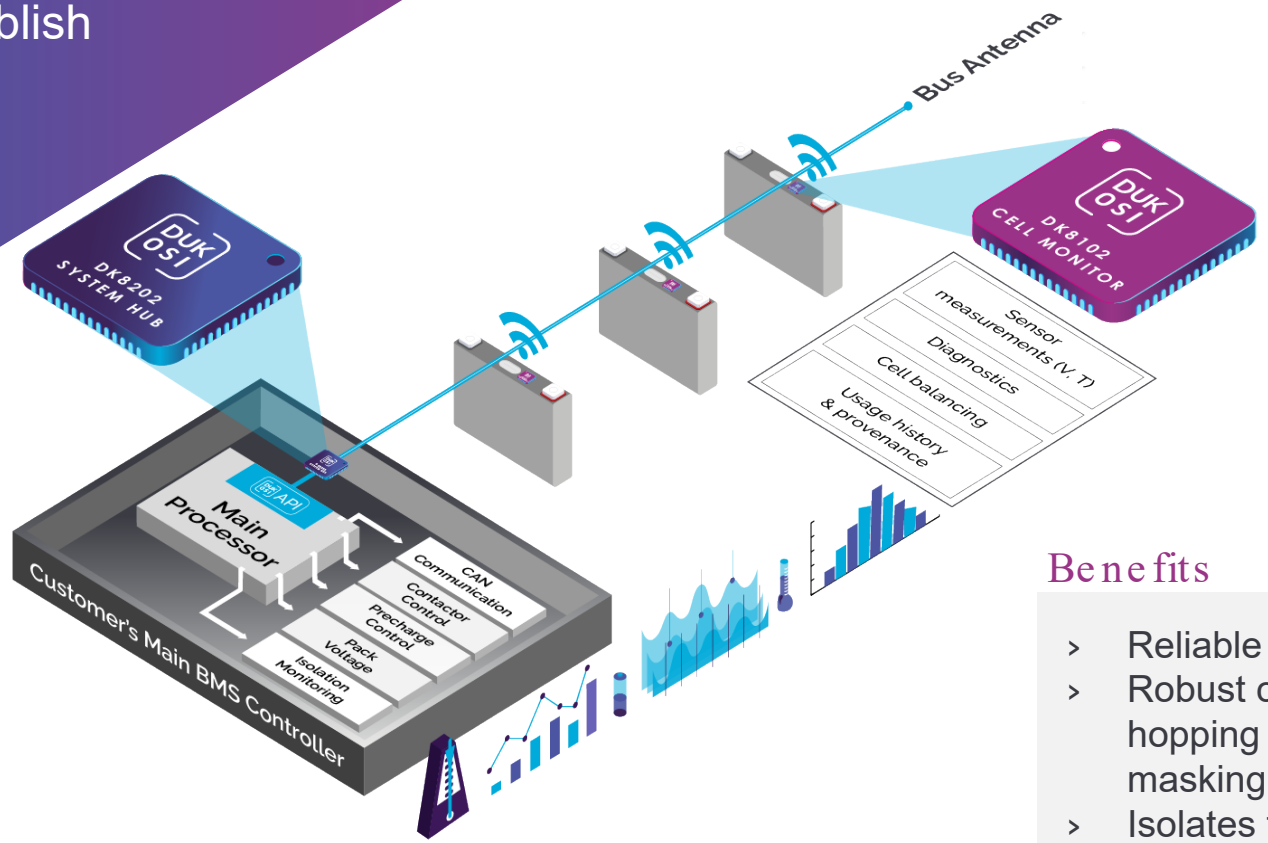
> On-cell traceability (supporting battery passport)



Introducing the first integrated circuits that monitor each cell and integrate C-SynQ®, a proprietary contactless communication protocol

C-SynQ® with Contactless Communication

In the DKCMS, C-SynQ® is implemented using a single bus antenna to establish contactless communication.



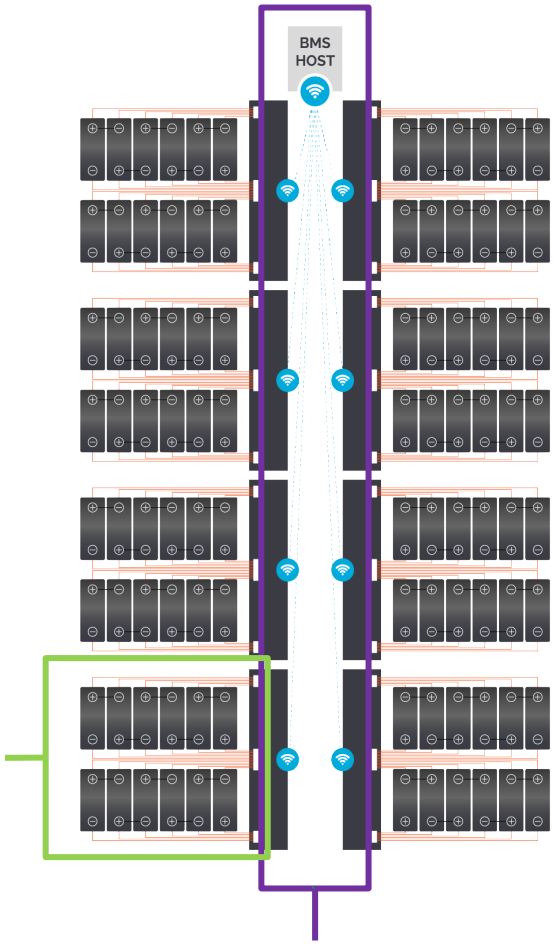
Benefits

- Reliable star network
- Robust communication (channel hopping and auto channel masking)
- Isolates the BMS from the system high voltage

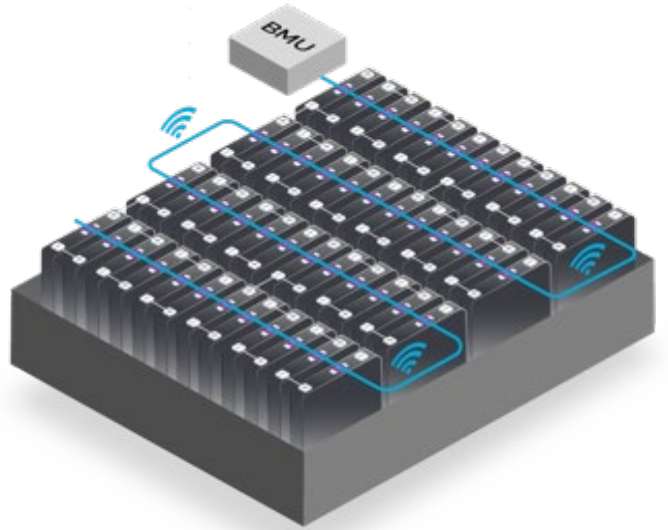
Design Evolution of the Battery Pack

Wired
(module to BMS host)

Wired Modules
(cell to PCBA)

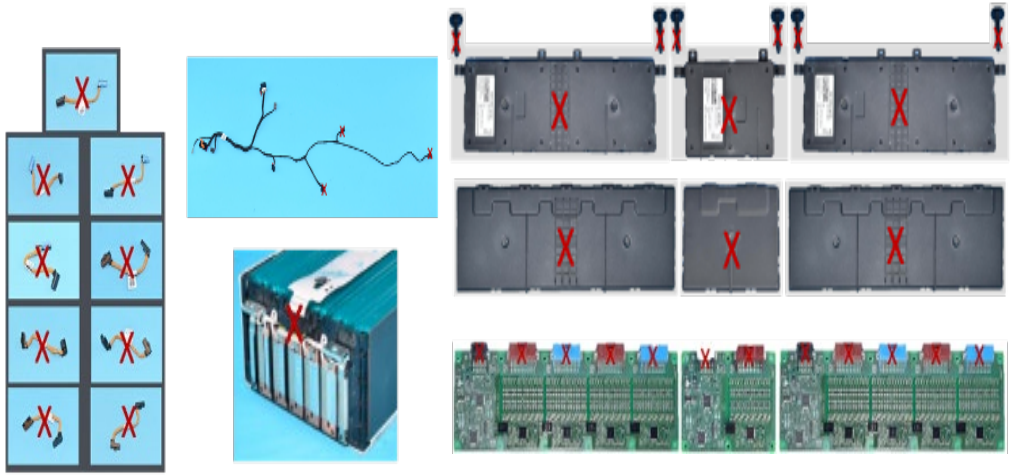


Far Field Wireless
(module to BMS host)



'True' CELL-TO-PACK with CHIP-ON-CELL TECHNOLOGY

Battery Simplification and Scalability -> Manufacturability



AFE PCB

Connectors

Balance resistor boards

HV Isolators

ISO SPI

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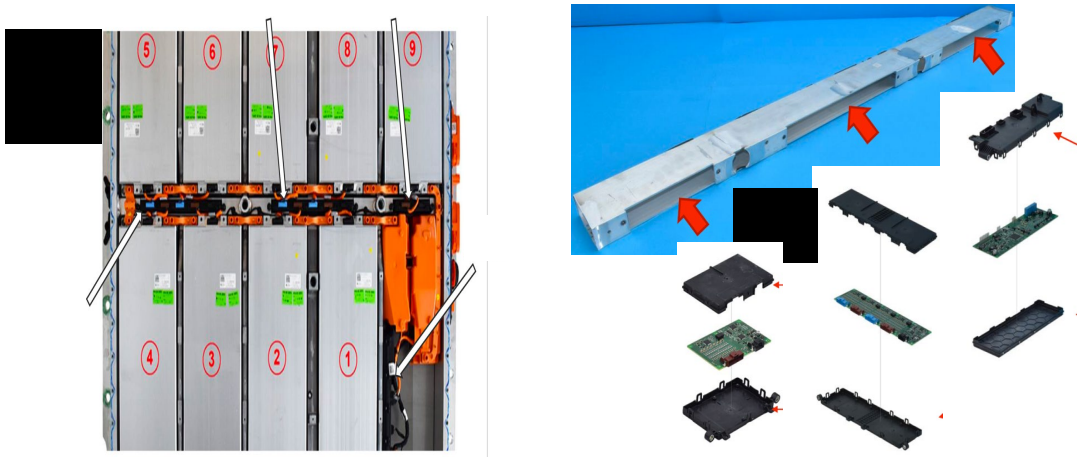
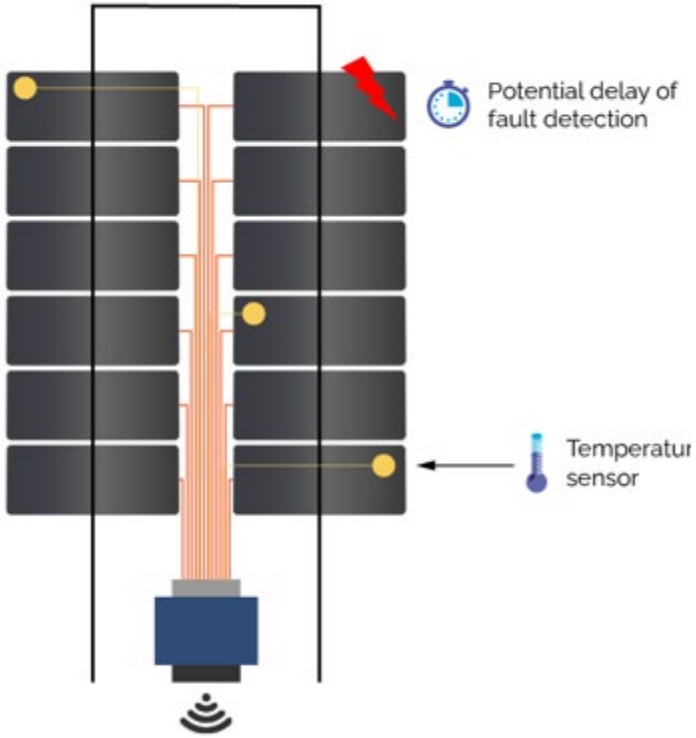


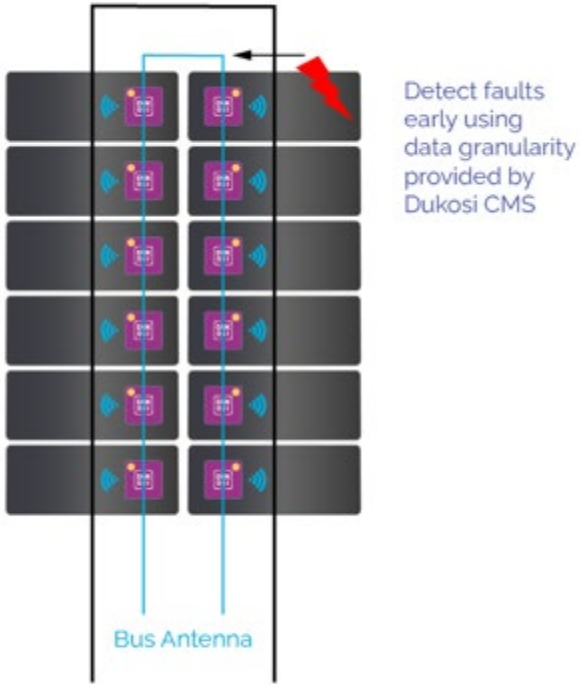
Up to 10x less components!!!!
Up 2x improved reliability!!!!

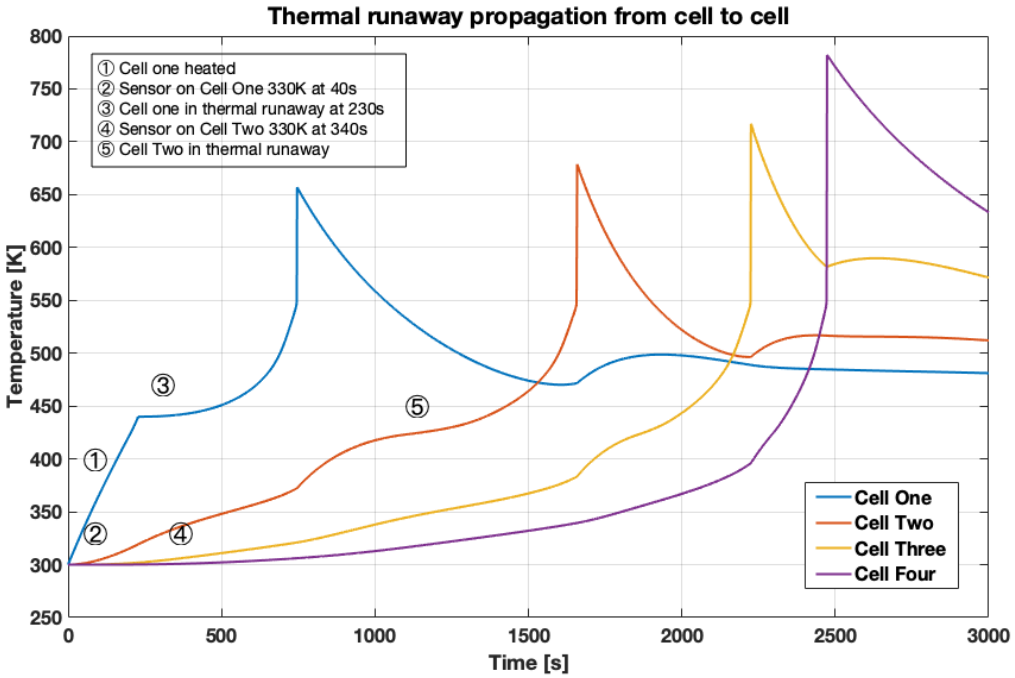
Legacy systems

Dukosi enabled

Enhanced safety by using Dukosi chip-on-cell





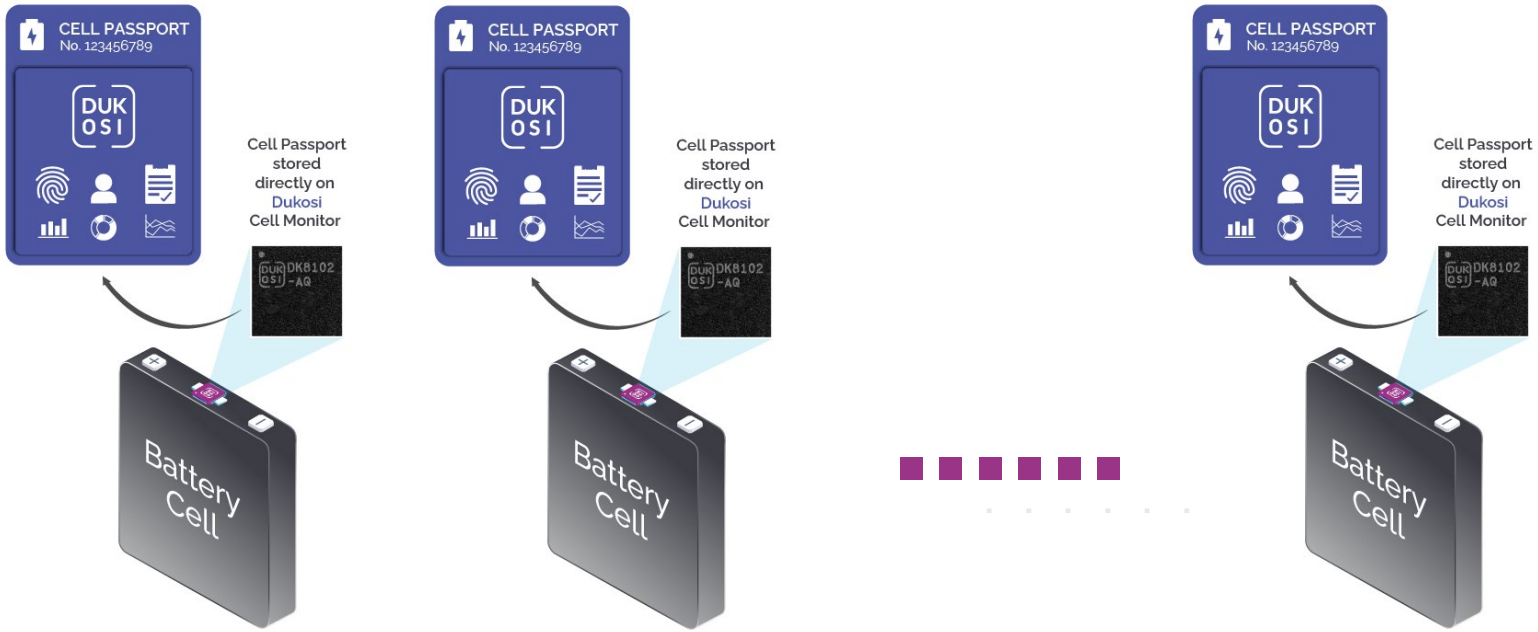


TRADITIONAL APPROACH

CHIP-ON-CELL TECHNOLOGY

Early detection of temperature excursions before cascading failure occurs

What happens to the cell, stays on the cell!



Last updated: 26/05/2023	
Parameter	**Value**
Cell ID	123456
Date of Production	19/05/2023
Cell Chemistry	NMC622
Runtime (hrs)	450
Cycle Number	112
Lowest Temp. (°C)	-12
Highest Temp. (°C)	57
State of Charge (%)	68
State of Health (%)	97
State of Available Power (W)	368.4

Limit Breach Events Log
Event 1: Max Op Temp, 20230521, 14:18:36.3, 57

Example of a Cell Passport

> "*Achieving a **high performing** , **fully sustainable** battery in a **cost-effective** way is possible today. Thanks to the cooperation with Dukosi, the Hyundai Motor Europe Technical Center could turn the European Green Deal from a burden into an opportunity. Dukosi's chip-on-cell monitoring solution with Cell Passport features, allowed us to develop a battery design that surpasses today challenges and furthermore enables an entire battery ecosystem for end customer and industry."*

Dr. Stephan Révidat , Hyundai Motor Europe Technical Center GmbH

Full traceability throughout the cell's lifecycle

Manufacturing

24/ 7 monitoring from day 1

Event logging

System Integration

Monitoring during shipping process

Dealing with warranty issues

Battery life

2nd life application

Repairability

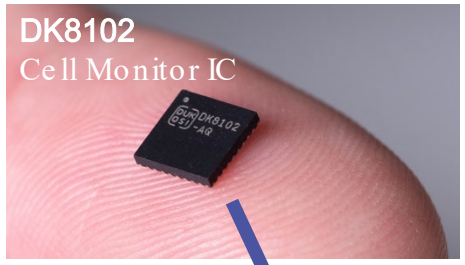
End of life

Recycling

Residual value

- Data collection and storage supports battery passport
- 100%synchronized measurements for improved battery safety and performance

Huge benefits for BESS architectures



Earlier detection of the onset of thermal incidents,
by detecting warm cells before they become hot cell through **measuring the temperature of each cell**

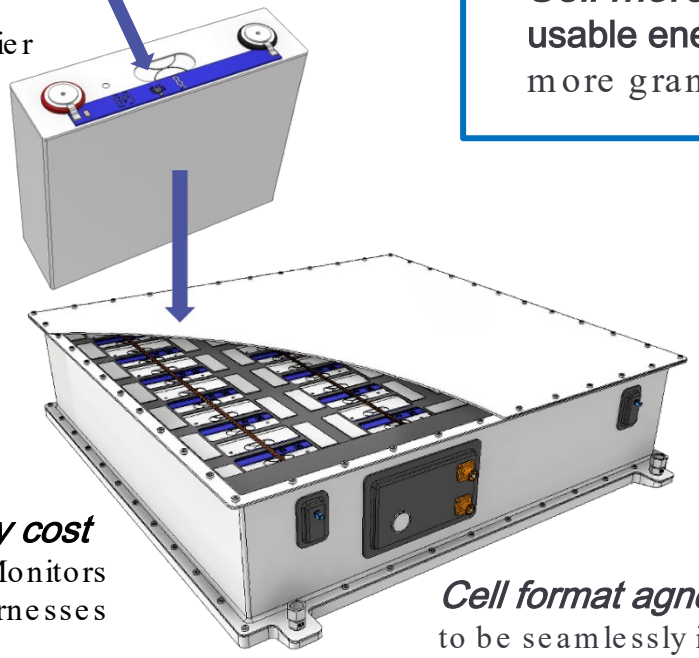
Reduce the potential for short circuits
by **designing out energized sense lead** harnesses and flexPCBs

Reduce the potential for isolation breakdowns with the intrinsically electrically isolated contactless communication bus

Maximize uptime
by **designing out** more failure prone sense lead **connectors / pins**

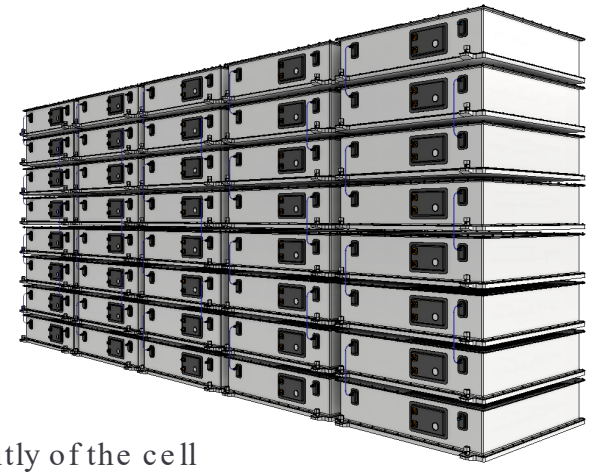
Automate assembly
with **high volume installation** at your LFP cell supplier

Sell more energy and ancillary services by extracting more **usable energy** every day utilizing more accurate voltage and more granular temperature measurements



Perfectly scalable
for 52S battery subpacks (four rows of 13S)

Reduce pack assembly cost
with pre-installed Cell Monitors and no sensing harnesses

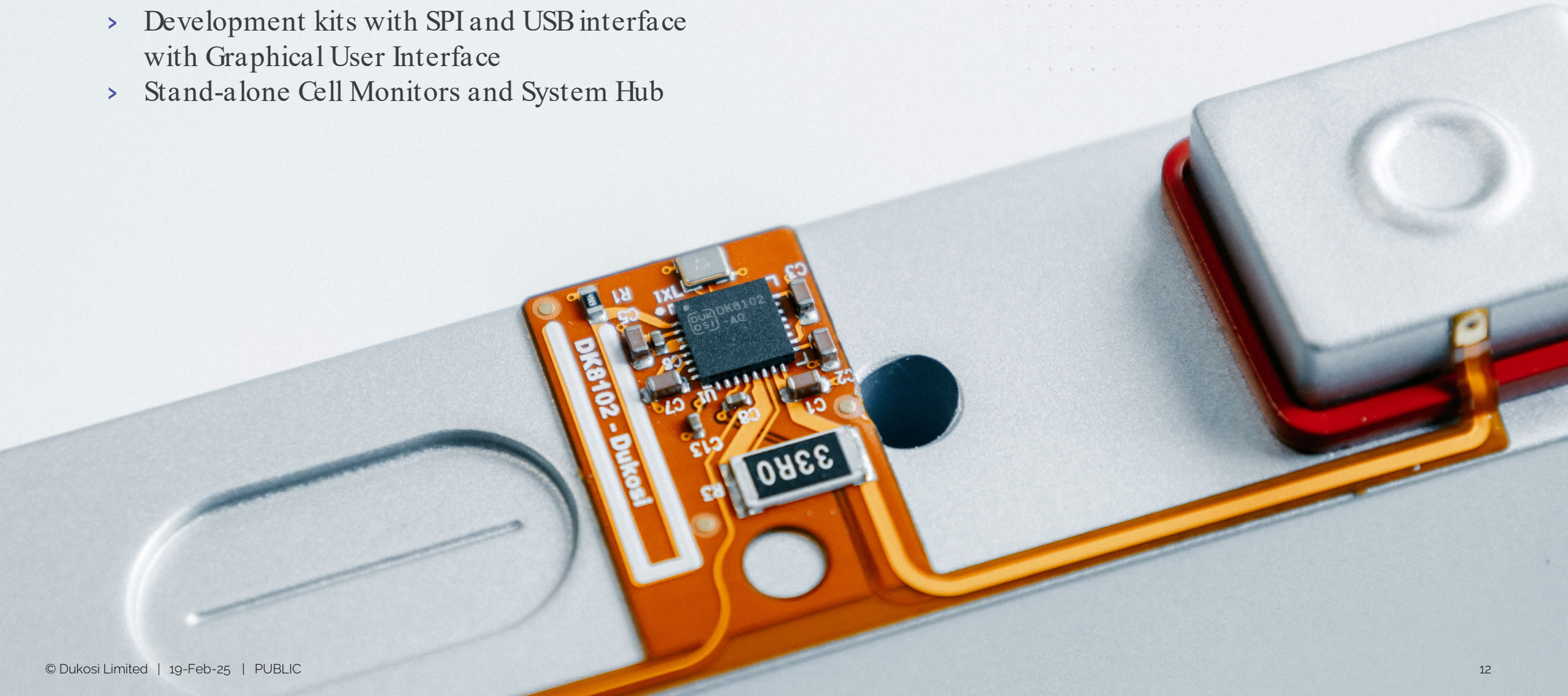


Easily configurable
to common 416S (1500V) configurations like eight subpacks in series

Cell format agnostic
to be seamlessly integrated independently of the cell format: prismatic, pouch or cylindrical

Production silicon available!

- Development kits with SPI and USB interface with Graphical User Interface
- Stand-alone Cell Monitors and System Hub



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