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Günter Behlau

Project Engineer Components

WEBINAR

# PowerBusbar PCB: Efficient High-Current Solutions for Modern PCB Design



EN | 22 October, 2025 | 11:30 a.m.

# AGENDA

## IN THIS WEBINAR WE WILL EXPLAIN ...

1. The principles behind PowerBusbar PCB
2. Requirements for implementation
3. Mounting busbars on the PCB
4. Benefits of this technology
5. Differences from other busbar mounting options
6. Practical examples
7. Q&A session

PowerBusbar PCB: Efficient High-Current-Solutions for modern PCB Design

# WÜRTH ELEKTRONIK GROUP

## WÜRTH ELEKTRONIK GROUP

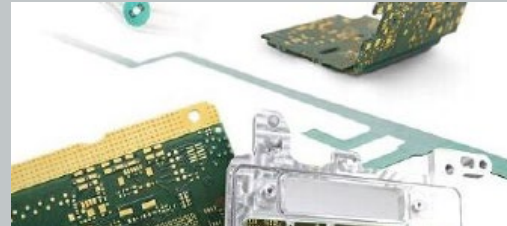
### WÜRTH ELEKTRONIK eiSoS ELECTRONIC & ELECTRO- MECHANICAL COMPONENTS

- Passive Components
- Thermal Management
- Radio Modules
- Optoelectronic Components
- Electromechanical Components (e.g. Redcubes)
- ...



### WÜRTH ELEKTRONIK CBT CIRCUIT BOARD TECHNOLOGY

- Rigid PCB
- RIGID.flex (PCB)
- PURE.flex (PCB)
- Stencils



### WÜRTH ELEKTRONIK ICS INTELLIGENT POWER & CONTROL SYSTEMS

#### SYSTEM SOLUTIONS

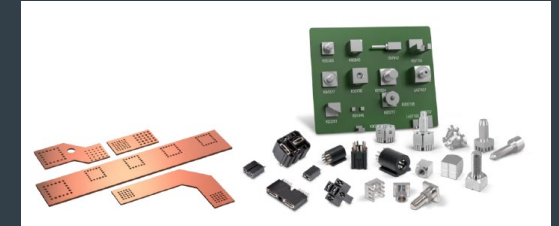
- Power Distribution
- HV Solutions
- Electronics Controllers
- HMI Solutions



#### PCB COMPONENTS

(with [powerelement.com](https://www.powerelement.com))

- Powerelements and lead free Powerelements
- PowerSockets
- PowerBusbars



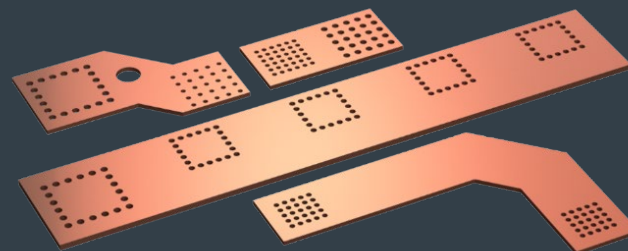
# PowerBusbar PCB: Efficient High-Current-Solutions for modern PCB Design

## WÜRTH ELEKTRONIK ICS

### POWERELEMENTS



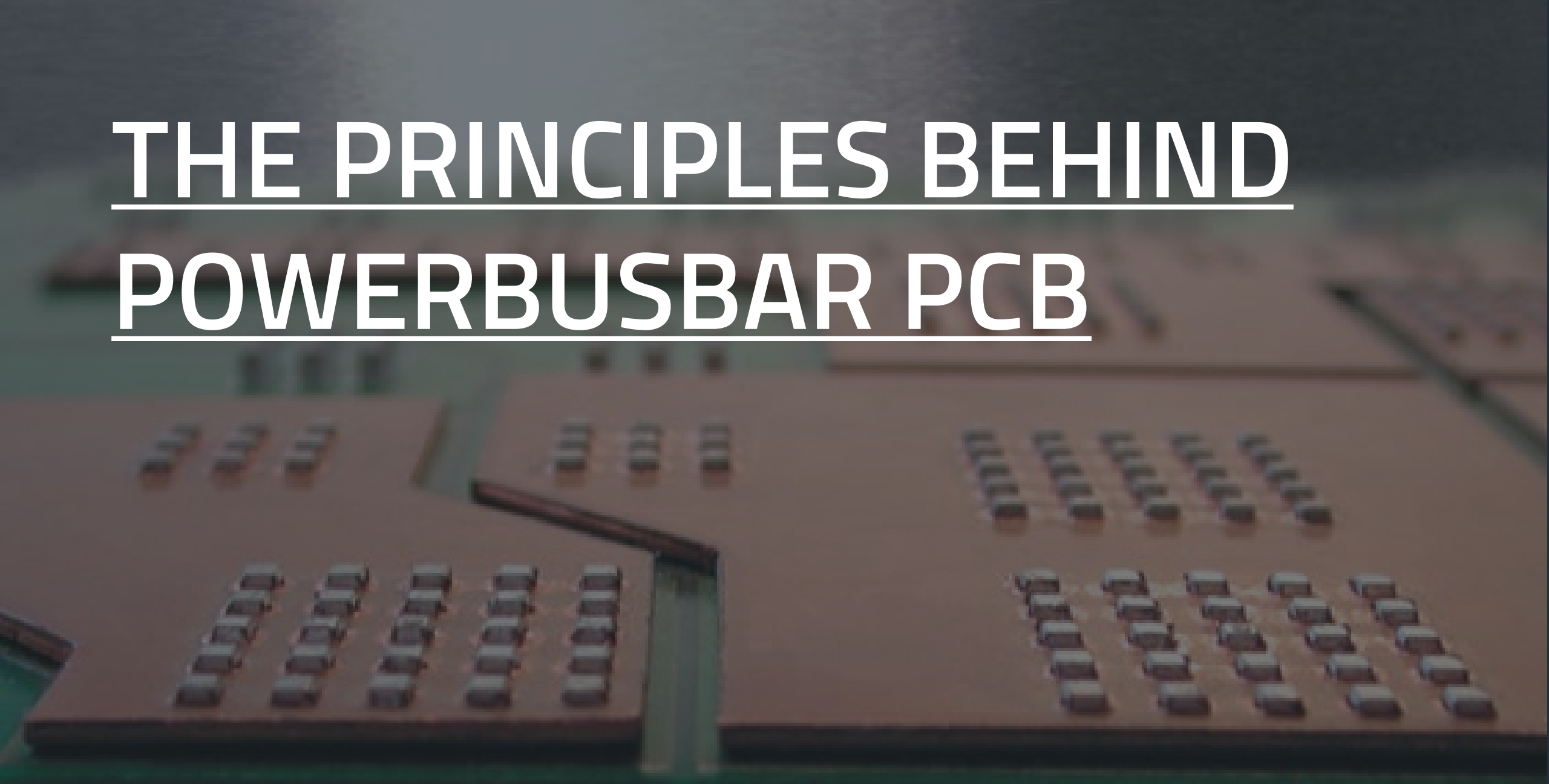
### POWERBUSBARS



### POWERSOCKETS



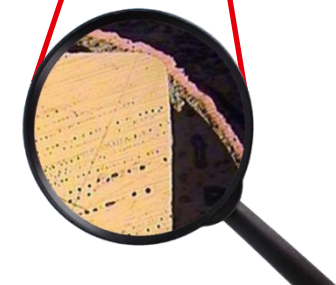
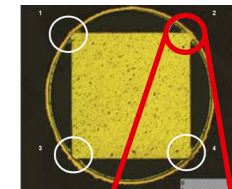
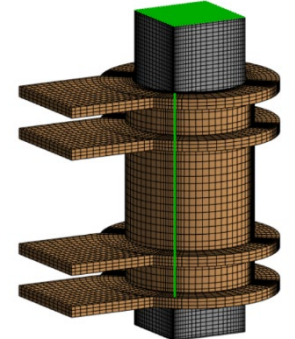
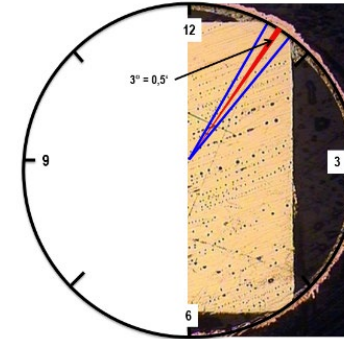
# THE PRINCIPLES BEHIND POWERBUSBAR PCB



## THE PRINCIPLES BEHIND POWERBUSBAR PCB

### THE POWERBUSBAR TECHNOLOGY...

- connects the busbar and PCB components using the proven massive press-fit technology.
- relies on massive press-fit technology, which has proven itself when a high-performance, gas-tight electrical connections characterized by very low electrical resistance.
- focuses on applying the proven connection technology directly to a copper busbar and processing it simultaneously with the high-current contact (Powerelement) in a single manufacturing step.
- utilises the contact pins of the Powerelement to create a reliable connection between the Powerelement, PCB and busbar by pressing them into precisely manufactured, plated-through holes.
- enables the use of standard PCBs, eliminating the need for expensive PCB designs with multiple copper layers or embedded copper inlays.



## THE PRINCIPLES BEHIND POWERBUSBAR PCB

### BENEFITS OF PRESS-FIT TECHNOLOGY

- **Seamless** and very **homogeneous material transition** between press-fit pin and PCB copper
- **Gas tight connection** through cold welding
- Thanks to the cold-welded connection, there is **significantly less contact resistance** between the press-fit pin and the circuit board sleeve
- **No thermal stress** on the PCB
- **No risk of cold solder joints**
- Excellent **mechanical stability** under hardest environments
- High **mechanical strength** and **vibration resistance**
- **Compact design** of assemblies and **reduction of installation space** through double-sided assembly of PCB



# REQUIREMENTS FOR IMPLEMENTATION

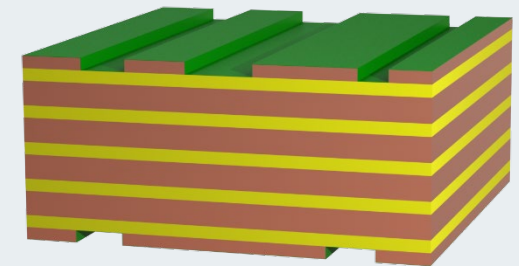
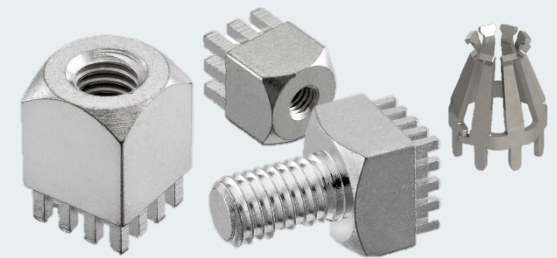
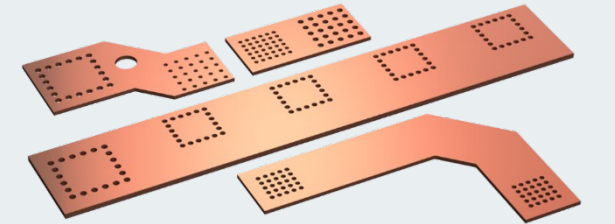


# PowerBusbar PCB: Efficient High-Current-Solutions for modern PCB Design

## REQUIREMENTS FOR IMPLEMENTATION

### THE POWERBUSBAR TECHNOLOGY REQUIRES ...

- **BUSBAR**  
The busbar thickness should typically range from 1.0 to 1.5 mm.  
The busbar's shape will be customised to meet customer specifications.  
When determining the width of the PowerBusbar PCB, the dimensions and layout of the planned Powerelements must be carefully considered.
- **POWERELEMENT FOR PRESS-FIT TECHNOLOGY**  
The Powerelement should be selected based on the required current-carrying capacity and the interface type, such as screwing or plugging.  
The nominal pin length of the Powerelement is typically 3.5 mm.
- **PRINTED CIRCUIT BOARD (PCB)**  
The standard PCB thickness should up to 2.0 mm.  
The PCB hole specifications must comply with Würth Elektronik ICS requirements based on the selected Powerelements.



# PowerBusbar PCB: Efficient High-Current-Solutions for modern PCB Design

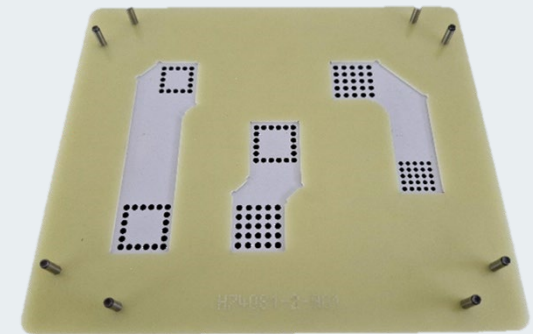
## REQUIREMENTS FOR IMPLEMENTATION

### THE POWERBUSBAR TECHNOLOGY REQUIRES ...

- **PRESS-FIT PAD**  
The press-fit pad supports the PCB during the press-in process, preventing bending and ensuring mechanical stability.
- **PRESS-IN TOOL**  
Suitable press-in tools, specifically tailored to the respective Powerelements are required.
- **PRESS**  
For sample and prototype production, a simple toggle press is sufficient. For series production, we recommend using a press equipped with force and stroke monitoring.

#### **CONCLUSION: SIMPLE APPLICATION**

When the specified guidelines are followed, press-fit technology becomes a simple and reliable step in series production.



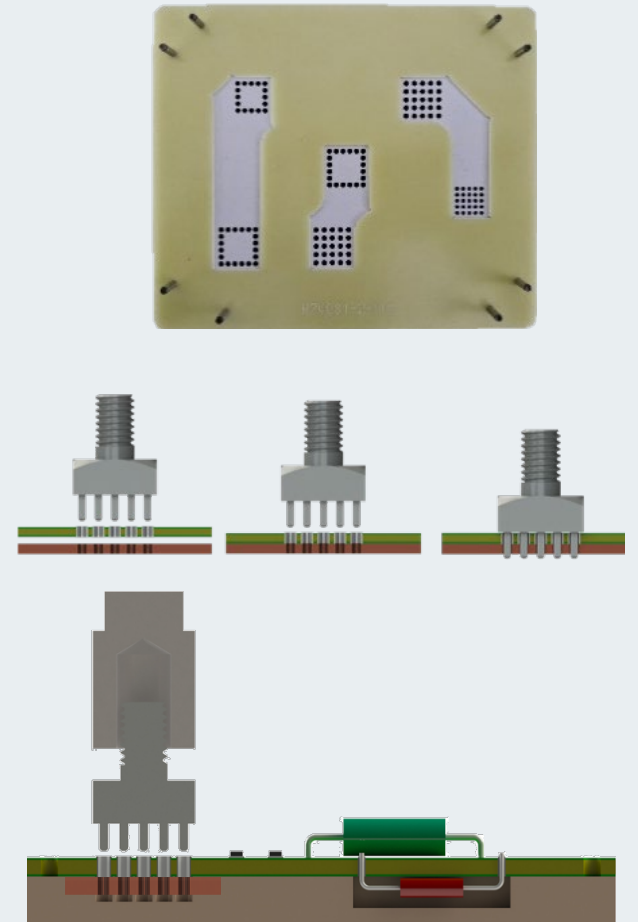
# MOUNTING BUSBARS ON THE PCB



## MOUNTING BUSBARS ON THE PCB

### THE POWERBUSBAR PROCESSING STEPS

- Busbars can be positioned either above or below the PCB.
- When positioned below the PCB, the press-fit pad includes a recess that precisely matches the contour of the PowerBusbar PCB.
- The PCB is placed above the busbar on the press-fit pad.
- The Powerelement is aligned at the interface with the PCB, and the corresponding press-in tool is applied.
- Using a press, the Powerelement is pressed through the PCB into the busbar.



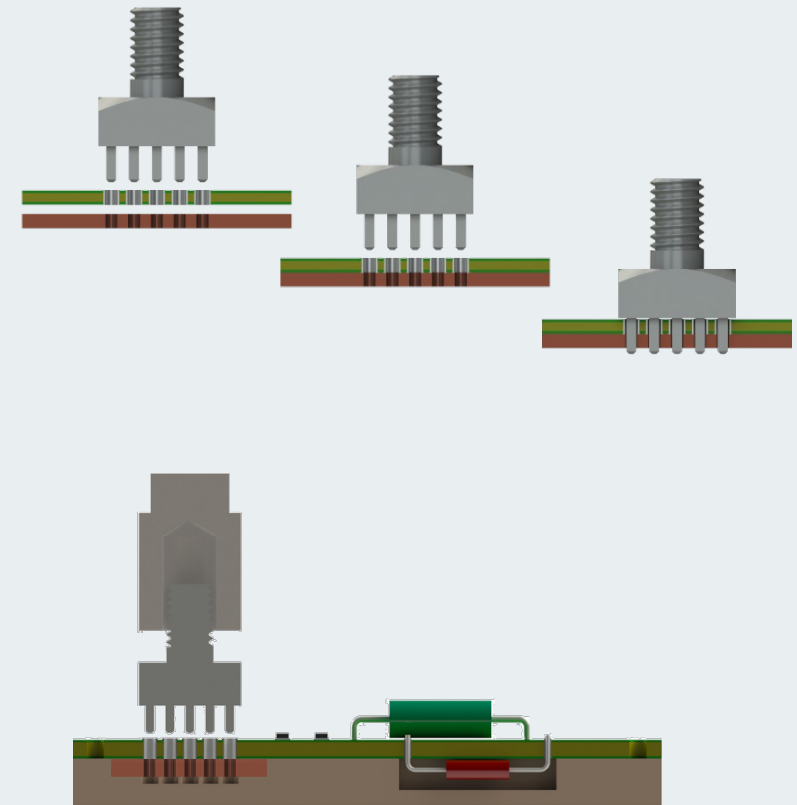
## MOUNTING BUSBARS ON THE PCB

### THE POWERBUSBAR PROCESSING STEPS REQUIRE ...

- that both the busbar and PCB are optimally supported during the press-fit process to prevent damage.
- that the interface between the Powerelement and the PCB complies with the drill specification requirements.
- that the interface between the Powerelement and the Busbar is optimized to support the positioning of the Busbar either above or below the PCB.

#### **CONCLUSION:**

The press-fit process establishes an electrically and mechanically stable connection between all components, ensuring high reliability.



# BENEFITS OF THIS TECHNOLOGY

A close-up photograph of a power busbar assembly. The busbar is a long, dark metal strip with several rows of electrical terminals. Each terminal consists of a small metal contact and a larger, cylindrical terminal cap. The assembly is mounted on a green printed circuit board (PCB). The background is blurred, showing more of the assembly.

## BENEFITS OF THIS TECHNOLOGY

### THE POWERBUSBAR TECHNOLOGY OFFERS ...

- **COST ADVANTAGES**

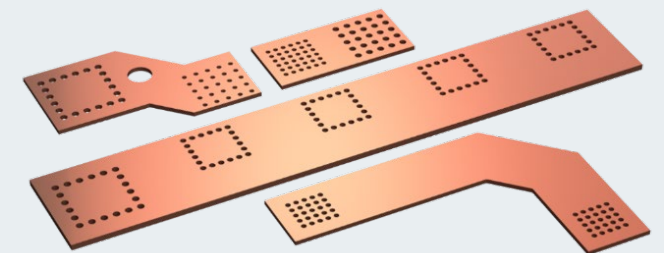
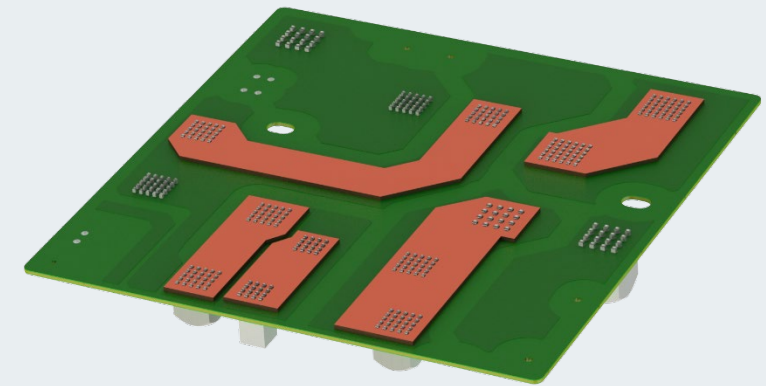
Cost-effective standard PCBs can be used as an alternative to heavy copper or specialized PCBs with copper inlays. This results in a simpler PCB structure and more cost-efficient manufacturing.

- **EASY INSTALLATION**

Busbars are mounted onto the PCB together with the Powerelements in a single step, eliminating the need for any additional fastening of the busbar.

- **SAFETY AND RELIABILITY**

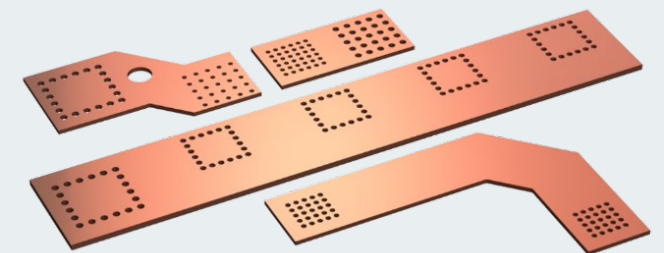
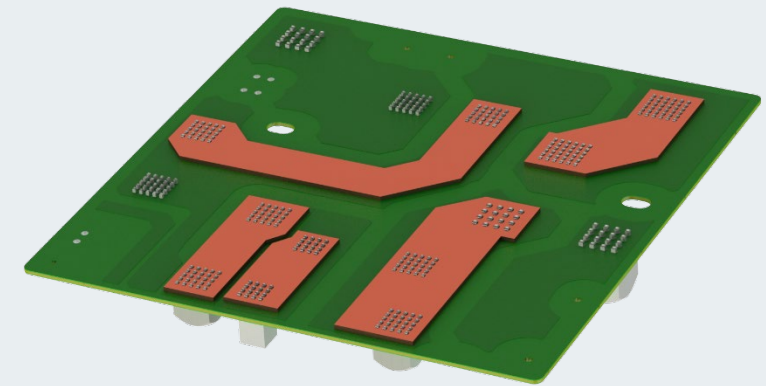
Massive press-fit technology is one of the most robust and reliable connection technology, proven across numerous applications. It offers one of the lowest failure rates (FIT) in the market.



## BENEFITS OF THIS TECHNOLOGY

### THE POWERBUSBAR TECHNOLOGY OFFERS ...

- **HIGH ELECTRICAL CONDUCTIVITY**  
Busbars are excellent conductors that enable efficient, low-loss power transmission. They provide localized current enhancement, applying increased current only where it is needed.
- **HIGH THERMAL CONDUCTIVITY**  
Busbars efficiently dissipate heat throughout the system, preventing hotspots and significantly enhancing overall reliability.
- **INTEGRATION AND ADAPTABILITY**  
Busbars are always customized to perfectly fit the specific design requirements of each application, ensuring seamless integration into existing systems.
- **REACH AND ROHS COMPLIANCE**  
Busbars comply with REACH and RoHS regulations.



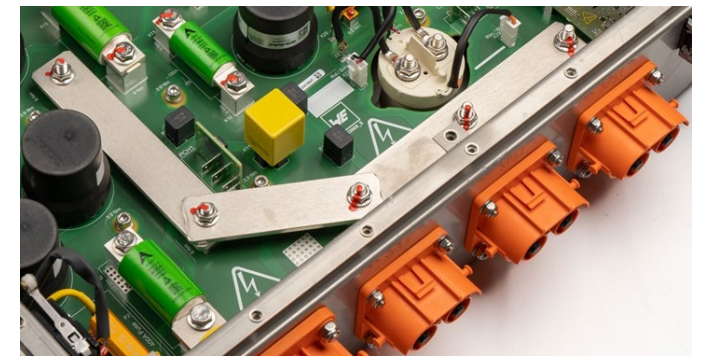
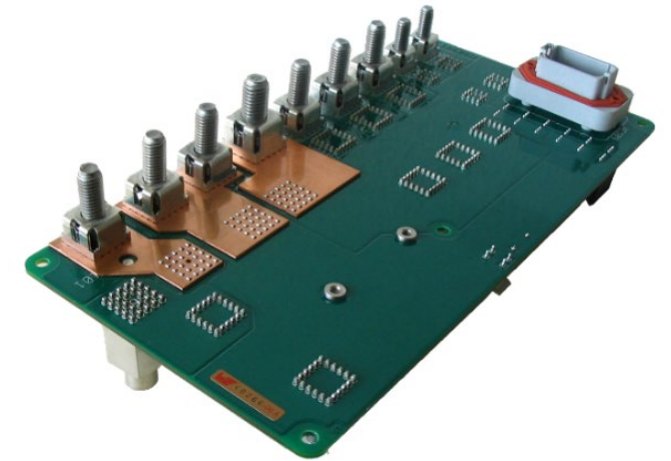
# DIFFERENCES FROM OTHER BUSBAR MOUNTING OPTIONS



## DIFFERENCES FROM OTHER BUSBAR MOUNTING OPTIONS

### MOUNTING ADVANTAGES

- Busbars are mounted directly onto the PCB through the Powerelement in a single step, requiring no additional processing.
- No extra fastening with cable lugs or simple copper bridges is necessary.
- This reduces the number of screw connections, thereby increasing overall system reliability.
- The busbars lie flat on the PCB surface, resulting in a compact and flat system design.



# PRACTICAL EXAMPLES

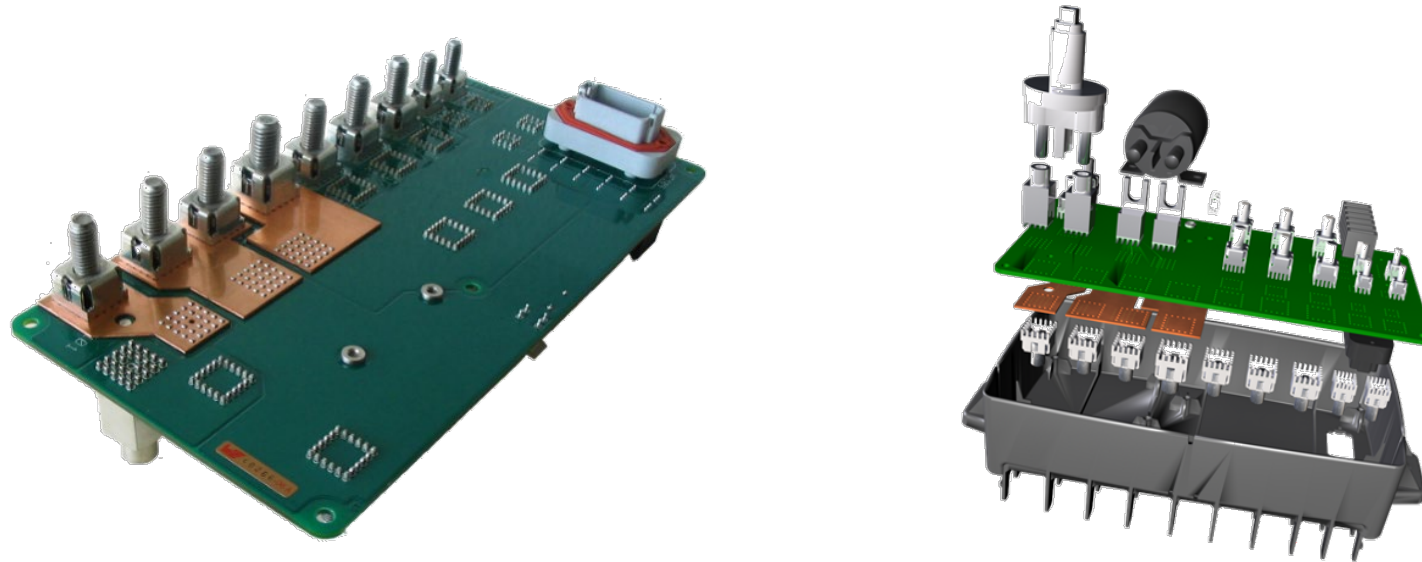


# PowerBusbar PCB: Efficient High-Current-Solutions for modern PCB Design

## PRACTICAL EXAMPLES

### **POWERBUSBAR PCB**

PowerBusbars reinforce current in- and outputs and forward the power to the power relay and the battery disconnect switch.

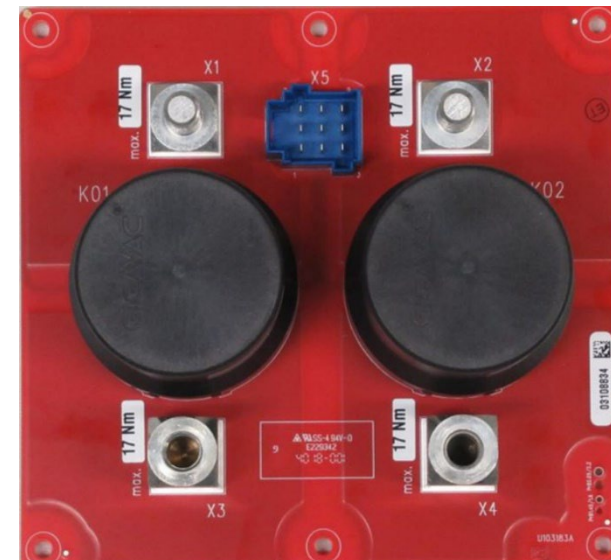
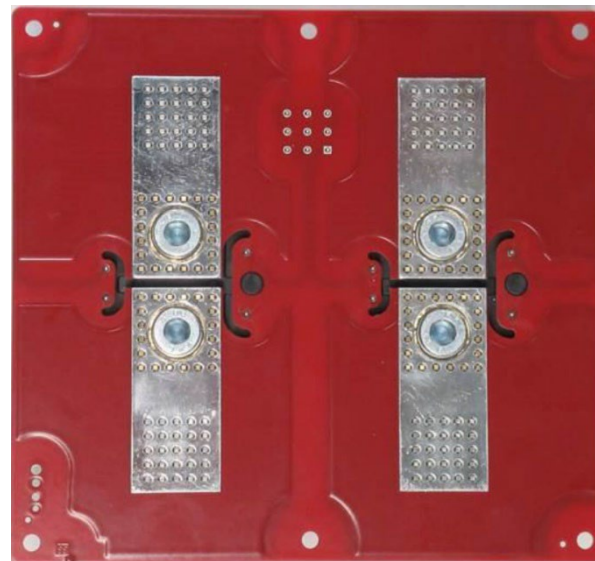


# PowerBusbar PCB: Efficient High-Current-Solutions for modern PCB Design

## PRACTICAL EXAMPLES

### POWERBUSBAR PCB

Option board for integration of 2 contactors in the vehicle.



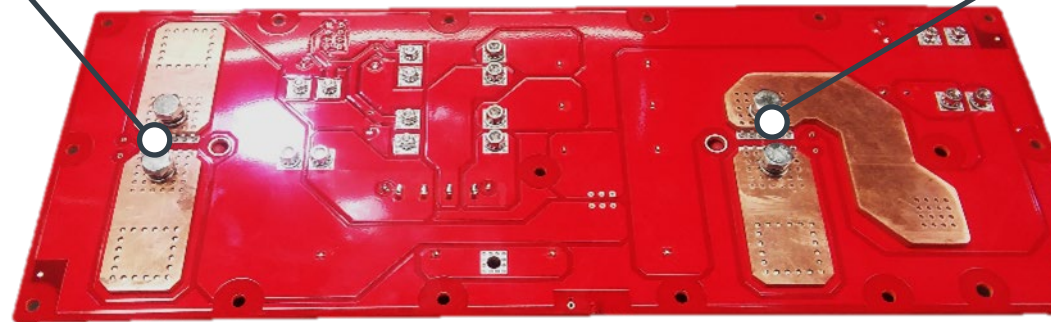
# PowerBusbar PCB: Efficient High-Current-Solutions for modern PCB Design

## PRACTICAL EXAMPLES

### POWERBUSBAR PCB

2 x board to contactor connection  
with Powerelement & screw

2 x board to contactor connection  
with Powerelement & screw

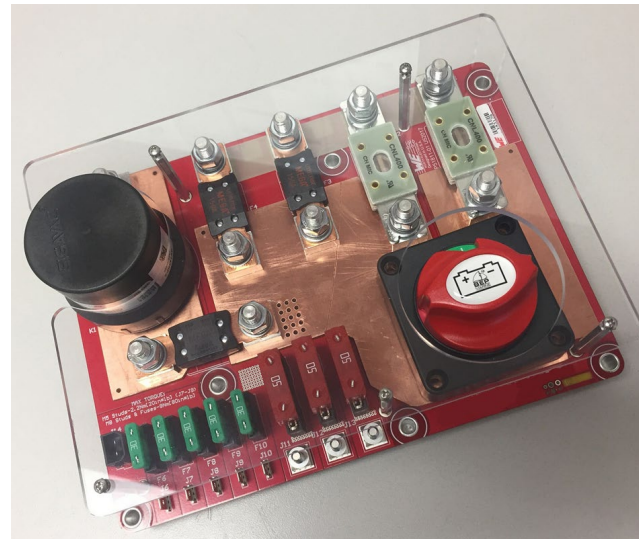


# PowerBusbar PCB: Efficient High-Current-Solutions for modern PCB Design

## PRACTICAL EXAMPLES

### POWERBUSBAR PCB

Option board for integration of 2 contactors in the vehicle.



Version PowerBusbar on top



# PRODUCT PROSPECTS



# PowerBusbar PCB: Efficient High-Current-Solutions for modern PCB Design

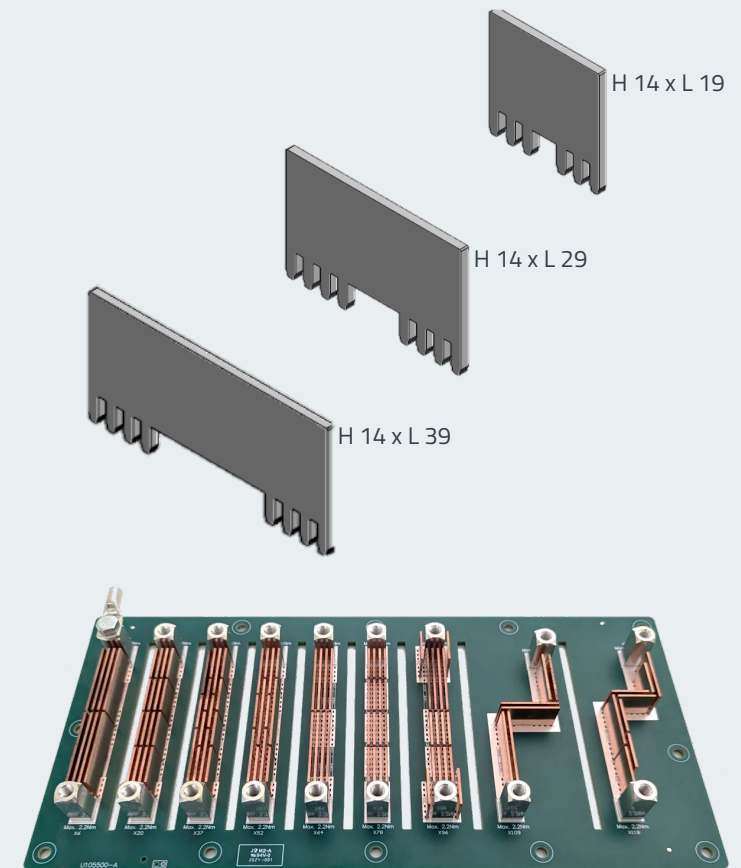
## PRODUCT PROSPECTS

**NEW PRODUCT**

### POWERBUSBAR VARIANT: POWERBUSBAR PRESS-FIT

**Modular copper alloy busbars in various sizes to locally increase the current-carrying capacity**

- Different variants for effective tracking and support of PCB traces
- Flexibility in the design of conductor paths
- Modular design through different busbar sizes
- Increased current carrying capacity
- Adaptability to complex layouts
- Cost efficiency through the use of standardised busbars
- Assembly method: massive press-fit technology



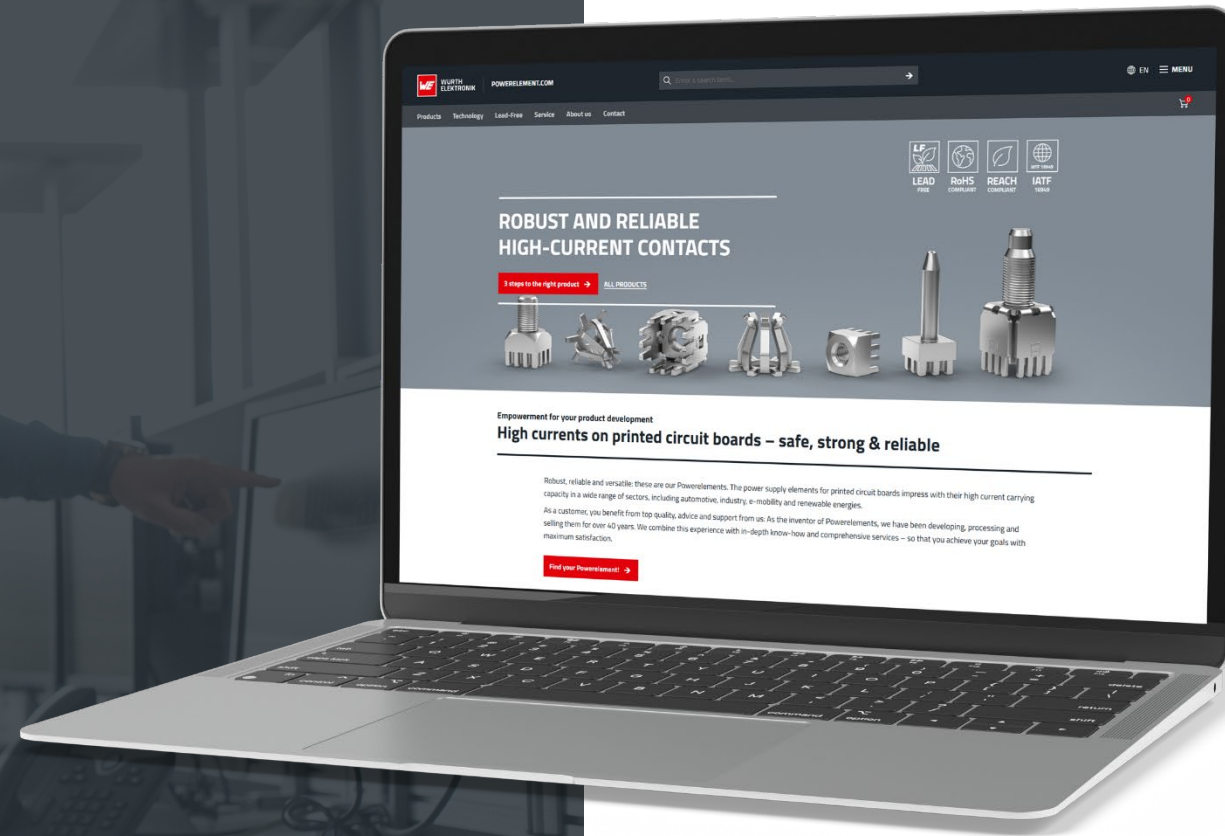
# PowerBusbar PCB: Efficient High-Current-Solutions for modern PCB Design

## ONLINE PLATFORM

### POWERELEMENT.COM

- Technology information
- Product details
- Data sheets / Footprint & Pinout
- Free CAD data
- Free product samples
- Cross reference request
- Updates on regulations & guidelines
- Personal contact person
- Newsletter

[TO POWERELEMENT.COM](https://www.powerelement.com)



THANK YOU

FOR YOUR ATTENTION!