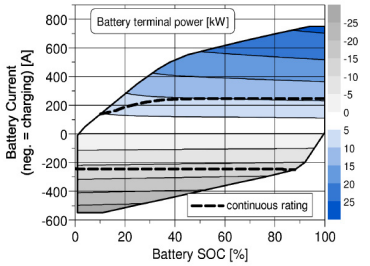
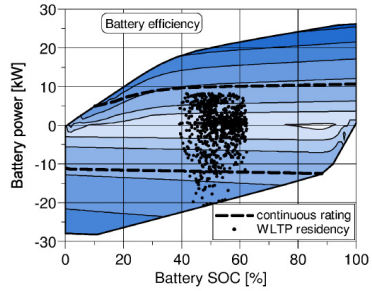
MAHLE Powertrain 03/2025

48V Battery Pack



Charging and discharging power map targets



Operating strategy ensures good control of SOC during WLTP

High Charge Rate 48V Battery Pack

48V mild hybridisation has become an attractive and commercially viable option due to significant savings in weight, package space and cost compared to high voltage alternatives. The safety considerations for vehicle maintenance are also a key factor in the adoption of 48V architectures.

For maximum benefits, high power capability is required for maximised recuperation during deceleration events in order to maximise capture of the braking energy available. The cost and installation package can be reduced by minimising the storage capacity of the 48V battery. These conflicting requirements lead to a small battery pack capable of repeated high-power charge and discharge events.

Analysis for a typical C-segment vehicle suggests that a charging capability of 20 kW enables the majority of available braking energy to be recovered.

Power deployment at the next acceleration event following a recuperation cycle is an effective control strategy; therefore only a modest electrical storage capacity is required.

Technical specifications	
Voltage level	48 V
Voltage range	36 - 52 V
Capacity	0.5 kWh
Charge / discharge power	Continuous - 10 kW Peak - 20 kW
Dimensions	Length - 420 mm Width - 270 mm Height - 237 mm
Temperature range	-20°C to + 55°C

20 kW peak charging capability
High efficiency cooling system

MAHLE Powertrain Ltd
Costin House, St James Mill Road
Northampton, NN5 5TZ
England
Tel. +44 (0)1604 738 000

MAHLE Powertrain GmbH
Wamslerstrasse 5
81829, Munich
Germany
Tel. +49 89 96 29 15-0

www.mahle-powertrain.com

MAHLE Powertrain 03/2025

Benefits

- 0.5 kWh, 48V Battery pack
  - › Designed to address electrification challenges
  - › High power cells enable high charge and discharge rates
- Chemistry avoids danger of thermal runaway
- High cycle life > 20,000 cycles
- Optimised cooling system
  - › Cell temperature maintained below 55°C
  - › Minimal complexity
- Bus bar design avoids additional heat input into cell terminals
- Capable of 10 kW continuous charging and discharging power
  - › Peak performance of 20 kW
  - › Suitable for any MHEV architecture from P0 to P4
- Optimised strategy keeps operating points of battery in highly efficient areas during the WLTP test
- 15% FE benefit
  - › Possible in a C-segment vehicle with P4 hybrid configuration

Summary

MAHLE Powertrain's new, in-house designed 48V battery pack has been conceived to provide repeated charging and discharging at these high power rates to maximise the potential for energy recuperation during deceleration and braking events.

This compact battery pack will offer significant opportunities for 48V mild hybridisation and is capable of supporting any MHEV architecture from P0 to P4.

MAHLE ZG Transmissions
Georg-Kollmannsberger-Str. 3
85386, Eching
Germany
Tel. +49 89 18 94 169-0

MAHLE Automotive Technologies
No, 1299 Huan Cheng Bei Road
Fengpu Industrial Park 201 401
Shanghai, Fengxian District, China
Tel. +00 (132) 987 654 321

www.mahle-powertrain.com