Solutions for traction systems
High-power semiconductors for highest demands in global traction systems

www.infineon.com/traction
Power semiconductors are imperative in state-of-the-art traction applications, such as locomotives, long-distance trains, metros and trams. You can find them in metro drive systems, in innovative high-speed trains and in auxiliary inverters. Among the most demanding of applications, high quality, reliability and lifetime are the most important product features in this market segment.

We supply IGBT modules with voltages of 1200 V to 6500 V and thus offer the optimal product solution for all possible traction applications worldwide. We fulfill the various electrical, mechanical and thermal requirements by optimized chip and module technologies. In addition, we ensure that new solutions are compatible with existing ones, so that our customers can look forward to continued availability over time.

The chip and module technology of our devices is individually adapted to each application. Furthermore, our ongoing research and development activities reinforce our position as an innovation leader and help us set future trends for the traction market.

Our contribution to your success

Our state-of-the-art solutions allow our customers to enjoy the benefits of standardized housings combined with maximum reliability.

We offer

› A wide portfolio of innovative components tailored to the needs of various traction converters and auxiliary power supplies
› Reliable and high-quality products that surpass even the most stringent requirements
› Advanced and cost-effective reference solutions and design support
› In-depth technical and system expertise from a dedicated regional support team

We combine our product expertise and system understanding to help our customers design their ideal technical solution. We regard lifetime, efficiency and power density as the main technical success factors for the future.
Power converter solution

**Application examples**
- Locomotives
- Metros
- Trams
- Passenger coaches
- Electric multiple units

**DC to AC power converter solution**

**Application examples**
- Locomotives
- Electric multiple units
- Passenger coaches
- High speed trains

**AC to AC power converter solution**
Packages in general
› Modularity
› Product voltage range 1200 V – 6500 V

IHM-B / IHV-B series
› 100% mechanically compatible with A-series
› +150 °C operation temperature
› Increased power cycling capability
› Better thermal cycling and thermal shock test capability
› Product voltage range: 1200 V, 1700 V, 3300 V and 4500 V
› Optimized heat spreading

PrimePACK™, EconoDUAL™ 3 and 62 mm
› Available in 1200 V and 1700 V voltage classes
› Power modules with embedded thermal sensor (NTC; for EconoDUAL™ 3 and PrimePACK™)
› Improved thermal impedance
› Optimized for single and parallel module operation
› +150 °C operation temperature
› Available with pre-applied TIM
› Better mechanical stability through ultrasonic welding (for PrimePACK™)
› Copper baseplates comply with traction standard (30000 thermal cycles at ΔT = 80 K for PrimePACK™)

6.5 kV IHV-A and XHP™ 3 package
› High reliability
› +125 °C (IHV-A) / +150°C (XHP™ 3) operation temperature
› Good power and thermal cycling capability

Freewheeling and clamping diodes in press pack housings
› Soft recovery diodes in disc housings in 4500 V up to 6500 V, 450 A up to 1960 A
› Soft recovery
› High di/dt capability
› Optimized for use as freewheeling diode for IGCTs & PPIs
Thermal Interface Material (TIM)
The only Infineon-qualified solution

Features
› Best-in-class thermal resistance
› Pre-applied to Infineon modules
› Dry to the touch
› Optimized for dedicated Infineon modules

Benefits
› Reduced process time in manufacturing
› Simplified mounting
› Increased system reliability
› Increased system lifetime
› Optimized thermal management
› Improved handling in case of maintenance

The demand for high power densities in power electronics poses great challenges to the thermal interface between the power module and the heat sink. In addition a short manufacturing process time is essential to make the production of converters more efficient. The easy handling and reproducible application of thermal interface material is one way to improve the manufacturing and obtain a stable process result.

A specially developed thermal interface material pre-applied to our power modules outperforms the general-purpose materials available. TIM not only provides the lowest thermal resistance, it also fulfills the highest quality standards for power modules to achieve the longest lifetime and highest system reliability.

TIM has been developed to fit most of our existing power module packages as well as upcoming future designs. Using modules with pre-applied TIM will enable reproducible thermal performance of power electronic applications.

› Broad Portfolio available: www.infineon.com/TIM

The only Infineon-qualified solution

The only Infineon-qualified solution

Thermal improvement and long-term stability

<table>
<thead>
<tr>
<th>Time in HTS* [Weeks]</th>
<th>Tj–Tamb [K]</th>
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<tbody>
<tr>
<td>1</td>
<td>70</td>
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<tr>
<td>2</td>
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<td>4</td>
<td>85</td>
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<td>5</td>
<td>90</td>
</tr>
</tbody>
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*HTS: High Temperature Storing, Stress test 1000 h, 125 °C

- Mod-3: Material with gradual degradation
- Mod-2: Material with unexpected degradation
- Mod-1: Stable behavior as demanded
- Infineon TIM with superior performance
Service, support and solutions

We always strive to have an open dialogue with our customers, who benefit from innovative technologies, services and technical support. Many innovative products have been developed on this collaborative basis.

Our experienced team of regional application engineers constantly supports our customers in incorporating our products into their projects. We provide various solutions, for example, evaluation boards and gate drivers, to enable fast and reliable integration of our modules and devices into traction power systems.

Regular quality certification audits performed by independent organizations as well as by major customers ensure reliable processes and production.
IPOSIM

The Infineon Power Simulation program for loss and thermal calculation of Infineon power modules and disk devices

IPOSIM is an easy to use yet sophisticated online simulation tool for loss and thermal calculation of Infineon power modules and disk devices.

IPOSIM helps you to select the right Infineon bipolar modules or disk devices for your rectifier or AC switch applications as well as suited IGBT modules for your inverter or DC converter applications. B2, B6, M3.2, M6, W1C, W3C, 2-Level, 3-Level, buck and boost topologies can be calculated.

IPOSIM performs a calculation of switching and conduction losses for all components, taking into account conduction and switching characteristics as well as thermal ratings. Where applicable, different control algorithms can be applied.

Thermal conditions can be adapted by user defined or predefined heat sinks. Beside single operation points complete load cycles may be calculated. Results will be shown in tabular and graphic representation and can be saved for later revision or printed as PDF file.

Features

› Calculation of thermal performance
› Direct comparison between products
› Calculation of complete load cycles
› Save calculations for later revision

› Where to find IPOSIM:
www.infineon.com/iposim
Solutions for traction applications present many challenges and requirements. In addition, there is a strong demand for cost savings and fast time-to-market enabled by accelerated design cycles. Technical support from a trusted supplier can help designers meet these challenges. Reliable components, powerful solutions and effective design-in support have thus become key success factors.

Recent semiconductor development has brought several technology innovations to the market and revolutionized performance. The IGBT newest chip technologies with trench structure and field stop concept have set new standards in energy efficiency. Optimized static and dynamic parameters are leading development engineers to previously unfeasible system efficiency targets. Elevated operation junction temperatures have increased power densities up to 50%. Thanks to standardization of module package footprints, our customers can see how well the modularity of Infineon products impacts design time and flexibility.

We are always with our customers and we deliver the most reliable products available on the market. We are proud to help our customers achieving their targets.
Service hotline

Infineon offers its toll-free 0800/4001 service hotline as one central number, available 24/7 in English, Mandarin and German.

› Germany .................... 0800 951 951 951 (German/English)
› China, mainland ....... 4001 200 951 (Mandarin/English)
› India ......................... 000 800 4402 951 (English)
› USA ............................ 1-866 951 9519 (English/German)
› Other countries ........... 00* 800 951 951 951 (English/German)
› Direct access ............. +49 89 234-0 (interconnection fee, German/English)

* Please note: Some countries may require you to dial a code other than "00" to access this international number.
Please visit www.infineon.com/service for your country!