In perfect harmony –
with Infineon® Power Stacks
Heatsink & mounting concepts for bipolar semiconductors

www.infineon.com/powerstacks
Infineon® Power Stacks with bipolar power semiconductors are used in most varied applications in a power range from a few kilowatts up to several megawatts. The modular portfolio of our System Line covers solutions with thyristors and diodes and is optimized to the respective requirements. Three design lines by basic building blocks support the requirements from semiconductors, applications and markets:

### Compact Blocks
Compact Blocks are designed for thyristor and diode modules in pressure contact or solder bond technology and defined by a potential free common compact heatsink.

### Frame Blocks
Frame Blocks are designed for thyristor and diode discs and defined by high efficient two sided air cooling with perfect electrical conductivity in an insulating plastic frame.

### Tower Blocks
Tower Blocks are designed for thyristor and diode discs up to 8 kV and defined by highest insulation capability, highest current capability and for series connection of discs. It is recommended for Pulsed Power applications and follows a tower design.

### Your possible choice
- **22** heatsink designs
- **75** block designs
- **over 8,600** block variants
- **over 25,700** stack designs

### Applications
- Industrial AC and DC drives
- Soft starters, STATS
- Rectifiers and static by-passes in UPS
- Wind energy systems
- Welding, plating
- Electrolysis
- Electric heat
- High voltage direct current (HVDC) transmission systems
- Flexible AC transmission systems (FACTS)
- TAP changers for transformers
- Controllable transformers
- Pulsed Power, Crowbars
- Freewheeling and clamping circuits
- Exciter devices
- Rectifiers for voltage source inverters (VSI)

### Key benefits
- Simplify your process with approved heatsink and mounting concepts for all bipolar semiconductors
- Save time and reduce costs with one-stop service
- Use our fast and direct technical support to get your individual solution
Your individual solution

Approved heatsink and mounting concepts for semiconductors

<table>
<thead>
<tr>
<th>Semiconductor package (embedded)</th>
<th>Coolant</th>
<th>Operating voltage</th>
<th>Operating current</th>
<th>Insulation</th>
<th>Heatsink concept</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Air or liquid</td>
<td>Up to 1.2 kV AC</td>
<td>Up to 3 kA DC</td>
<td>Like modules</td>
<td>KM, KW</td>
</tr>
<tr>
<td></td>
<td>Air</td>
<td>Up to 2.5 kV AC</td>
<td>Up to 8 kA DC</td>
<td>Fiber Reinforced Plastics (FRP), plastics</td>
<td>Kx</td>
</tr>
<tr>
<td></td>
<td>Air or liquid</td>
<td>Up to 20 kV AC</td>
<td>Up to 14 kA DC</td>
<td>Fiber Reinforced Plastics (FRP), AIN, coolant</td>
<td>Ky</td>
</tr>
</tbody>
</table>

Each block is provided for the inclusion of one or more semiconductors. The limits arise only through physical conditions. More complex applications are supported with stacks, a combination of blocks.

Minimize risks and reduce time-to-market with approved heatsink and mounting concepts, approved building block systems and complex stack assembly solutions.

With our fast and direct technical support you will get your individual solution out of over 25,700 possible variants. Infineon Technologies Bipolar supports with more than 50 years’ experience in semiconductor converter design.
The Block Design Lines

The Block Design Lines are based on more than 22 heatsink concepts and offer a suitable design variant for every semiconductor package and for each application. Whether natural air cooling, forced air cooling or liquid cooling, all known requirements are supported. The liquid cooled blocks are available with aluminum, copper, stainless steel or insulated aluminum nitride cooling sockets. The Tower Blocks are available with steel, stainless steel or FRP clamping systems. Furthermore several options like protection circuits, firing circuits etc. are available.

<table>
<thead>
<tr>
<th>System Line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact Block</td>
</tr>
<tr>
<td>Forced air cooling</td>
</tr>
<tr>
<td>Forced air cooling</td>
</tr>
<tr>
<td>KM10</td>
</tr>
<tr>
<td>KM Flat</td>
</tr>
<tr>
<td>PB20 PB34 PB50 PB60 PB70</td>
</tr>
</tbody>
</table>

For an overview of liquid cooled blocks go to www.infineon.com/powerstacks
From Block to Stack

The Stack Design Lines are based on the Block Design Lines (the building blocks). The stacks thus offer all the properties of the blocks for more complex application circuits. All known application circuits can be realized. Furthermore several stack specific options like fuses, fans etc. are available. The table shows important examples for each Design Line. Others are available on request.

<table>
<thead>
<tr>
<th>Stack concept</th>
<th>Compact Stack (KM,KW)</th>
<th>Frame Stack (Kx)</th>
<th>Tower Stack</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stack package (example)</td>
<td>3KM17</td>
<td>3K017</td>
<td>2K54</td>
</tr>
<tr>
<td>Block package (embedded)</td>
<td>Compact Block</td>
<td>Frame Block</td>
<td>Tower Block</td>
</tr>
<tr>
<td>Block package (embedded)</td>
<td>KM14</td>
<td>K017</td>
<td>K54</td>
</tr>
<tr>
<td>Semiconductor package</td>
<td>Modules</td>
<td>Medium Power Discs</td>
<td>High Power Discs</td>
</tr>
<tr>
<td>Coolant</td>
<td>Air or liquid</td>
<td>Air</td>
<td>Air or liquid</td>
</tr>
<tr>
<td>Operating voltage</td>
<td>Up to 1,2kV AC</td>
<td>Up to 2,5kV AC</td>
<td>Up to 20 kV AC</td>
</tr>
<tr>
<td>Insulation</td>
<td>Like module</td>
<td>FRP, plastics</td>
<td>FRP, AIN, coolant</td>
</tr>
</tbody>
</table>

Some important circuits for stacks with bipolar semiconductors

<table>
<thead>
<tr>
<th>Bridge rectifier circuits</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>uncontrolled</td>
<td>B2U</td>
<td>B6U</td>
<td>B6.2U**</td>
</tr>
<tr>
<td>half controlled*</td>
<td>B2H</td>
<td>B6H</td>
<td>B6.2H**</td>
</tr>
<tr>
<td>full controlled</td>
<td>B2C</td>
<td>B6C</td>
<td>B6.2C**</td>
</tr>
</tbody>
</table>

* All half controlled bridge rectifiers available also with thyristors with common anode.
** Can be prepared for series, parallel or anti-parallel operation.
Stacks from Compact Blocks and Frame Blocks

Blocks need to be combined according to the application needs. The Stack Design Lines are combinations from blocks. Stacks from Compact Blocks are very flexible. A Compact Block can carry a single Power Block or multiple Powerblocks. Furthermore, a combination of Compact Blocks (usually up to 3) can carry multiple or complex circuits (e.g., two 6 pulse rectifier circuits or one 18 pulse rectifier circuit). Stacks from Frame Blocks are from modular design. Carrier for 2 or 3 Frame Blocks in one line are available (e.g., package 3K017 or 3K008). For more powerful or more complex circuits lines can be combined (e.g., package 6K005 or 6KE01). The table below shows examples for Compact Blocks and Frame Blocks. Solutions from Tower Blocks are available on request.

<table>
<thead>
<tr>
<th>Stack package</th>
<th>1 Block</th>
<th>2 Blocks</th>
<th>3 Blocks</th>
<th>Stack package</th>
<th>2 Disc Block</th>
<th>1 Disc Block</th>
</tr>
</thead>
<tbody>
<tr>
<td>KM14</td>
<td></td>
<td></td>
<td></td>
<td>3K017</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2KM14</td>
<td></td>
<td></td>
<td></td>
<td>6K012</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3KM14</td>
<td></td>
<td></td>
<td></td>
<td>3K008</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KM17</td>
<td></td>
<td></td>
<td></td>
<td>6K005</td>
<td></td>
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</tr>
<tr>
<td>2KM17</td>
<td></td>
<td></td>
<td></td>
<td>3KE02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3KM17</td>
<td></td>
<td></td>
<td></td>
<td>6KE01</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Air cooled B6C Stacks and load capability (examples for 690 V AC)

For an overview of liquid cooled stacks and Power Stacks go to www.infineon.com/powerstacks
Accessories for Blocks and Stacks

**Accessories for blocks**
- Temperature switch ($V_{op} \leq 400V$) and ($V_{op} \leq 690V$)
- Save Insulation for temp switch ($V_{op} \leq 1250V$)
- PT100 ($V_{op} \leq 400V$), PT1000 ($V_{op} \leq 400V$), PT1000 ($V_{op} \leq 690V$)
- NTC ($V_{op} \leq 400V$)
- Magnetic firing circuits (firing transformers)
- Support for optical firing circuits (fiber and driver unit)
- Clamping devices
- Snubber circuits (TSE)
- Fuses for semiconductors
- Micro switches for fuses
- Hose barbs for liquid cooled heat sinks
- Support for hoses for liquid cooling, water collectors and mechanical set up in the cabinet

**Accessories for stacks**
- Magnetic firing circuits (firing transformers)
- Optical firing circuits (fiber and driver unit)
- Fans
- Input overvoltage protection
- Output overvoltage protection (DC side)
- Fuses for semiconductors
- Micro switches for fuses
- Power rails
- Support for liquid cooling cool back systems, hoses for liquid cooling, water collectors, mechanical set up in the cabinet, air stream monitoring, controllers

Scope of delivery for Assemblies

Our expertise in semiconductor technology and its operational surrounding like cooling and passive overload protection led to powerful product lines for semiconductor stacks. The scope of delivery includes power semiconductors, cooling technologies and accessories like snubbers fuses, sensors, fans and firing circuits. We offer support for converter control and system control.
4 steps to your individual Power Stack

We support your requests flexible with building blocks:

1. Find a module or disc which supports your application needs
2. Choose one of the building blocks for basic circuits
3. Define the stack from blocks according the application needs
4. Add accessories according the applications needs

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