# Content

<table>
<thead>
<tr>
<th>Section</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>4</td>
</tr>
<tr>
<td>Applications</td>
<td>5</td>
</tr>
<tr>
<td>Overview Topology/Housing</td>
<td>6 - 7</td>
</tr>
<tr>
<td>Overview Topology/Application</td>
<td>8 - 9</td>
</tr>
<tr>
<td>PIM</td>
<td>10 - 16</td>
</tr>
<tr>
<td>PIM with PFC</td>
<td>17</td>
</tr>
<tr>
<td>IPM</td>
<td>18</td>
</tr>
<tr>
<td>Sixpack</td>
<td>18 - 22</td>
</tr>
<tr>
<td>Half-Bridge</td>
<td>23 - 24</td>
</tr>
<tr>
<td>H-Bridge</td>
<td>25 - 26</td>
</tr>
<tr>
<td>Rectifier</td>
<td>26 - 27</td>
</tr>
<tr>
<td>PFC</td>
<td>27 - 28</td>
</tr>
<tr>
<td>Solar Topologies</td>
<td>28 - 29</td>
</tr>
<tr>
<td>Booster</td>
<td>29 - 31</td>
</tr>
<tr>
<td>NPC</td>
<td>31 - 32</td>
</tr>
<tr>
<td>MNPC</td>
<td>33 - 34</td>
</tr>
<tr>
<td>Housing Dimensions</td>
<td>35 - 42</td>
</tr>
<tr>
<td>MiniSKiiP® Options</td>
<td>43</td>
</tr>
<tr>
<td>Phase Change Material</td>
<td>44</td>
</tr>
<tr>
<td>Press-fit Technology</td>
<td>45</td>
</tr>
<tr>
<td>Description – Naming System</td>
<td>46</td>
</tr>
<tr>
<td>Simulation Software (ISE)</td>
<td>47</td>
</tr>
</tbody>
</table>
Introduction

Vincotech develops and manufactures power modules and offers manufacturing services geared to help customers to master complex challenges in power electronics integration.

Vincotech is one of the market leaders in power modules. Target applications include motor drives, solar inverters, welding equipment, and power supplies.

With 16 different standard housings and more than 40 standard product families, Vincotech offers a wide power range using different topologies.

Products include Power Integrated Modules (PIM – a combination of input rectifier, inverter, and brake chopper) as well as sixpack inverters, rectifier, boosters, NPC converters, and PFC-, H- and half-bridge modules. Vincotech covers a broad power spectrum ranging from 5A to 450A at 600V and 1200V.
Applications

Vincotech power modules serve a wide and diverse range of applications, the most common of which are described below. The icons shown alongside each description indicate the applications for which the module is suited.

**Industrial Drives**
Standard drive applications for industrial use with power ranges from 1kW to 60kW. Topologies are Power Integrated Modules (PIM – rectifier, inverter, and brake), sixpacks (three-phase inverters), half-bridge and rectifier modules.

**Embedded Drives**
Integrated drive applications for industrial and home appliances. Typically used in fans, air conditioning, pumps, power tools, washing machines, and refrigerators. Solutions are Intelligent Power Modules (IPM), Power Integrated Modules with embedded Power Factor Correction (PFC) circuit, and rectifier modules with PFC.

**Solar Inverters**
Inverter applications for solar power systems. Transformerless and transformer-based inverters with single- and three-phase outputs. Special topologies such as asymmetric H-bridge, Neutral Point Clamped (NPC) inverters, and parallel and symmetric boosts for high efficiency. For systems with overall power up to 200kW.

**Uninterruptable Power Supplies (UPS)**
Power components for UPS applications. Modules for AC/DC and DC/AC power conversion. Topologies such as single- and three-phase rectifiers, half- and H-bridges, boosters, and NPCs. Power ranges up to 200kW.

**Welding**
Solutions for industrial welding applications, fast-switching half- and H-bridges, PFC and rectifier topologies. Special modules for zero-switching (ZVS) applications, with improved thermal resistance ($R_{th}$), or internal DC link capacitors for lower turn-off losses.

**Power Supplies**
Power components typically used in power supply applications. Modules with topologies such as rectifiers, PFC switches (single, dual, and interleaved), boost circuits (step-up and step-down), half-bridges, and H-bridges.
<table>
<thead>
<tr>
<th>Topology</th>
<th>Page(s)</th>
<th>Page(s)</th>
<th>Page(s)</th>
<th>Page(s)</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIM</td>
<td>flowPIM® 0 (Page 10)</td>
<td>flowPIM® 1 (Page 11)</td>
<td>flowPIM® 1B (Page 18)</td>
<td>flowPIM® 2 (Page 12)</td>
<td>flow90PIM 1 (Page 13)</td>
</tr>
<tr>
<td></td>
<td>(Page 17)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sixpack</td>
<td>flowPACK 0 (Page 18)</td>
<td>flowPACK 1 (Page 19)</td>
<td>flowPACK 2 (Page 19)</td>
<td>flow90PACK 1 (Page 20)</td>
<td></td>
</tr>
<tr>
<td>Half-Bridge</td>
<td>flowPHASE 0 (Page 23)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H-Bridge</td>
<td>fastPACK 0 H (Page 25)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rectifier</td>
<td>flowCON 0 (Page 26)</td>
<td></td>
<td></td>
<td></td>
<td>flow90CON 1 (Page 27)</td>
</tr>
<tr>
<td>PFC</td>
<td>flowPFC 0 (Page 27-28)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar Topologies</td>
<td>flowSOL 0 (Page 28-29)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Booster</td>
<td>flowBOOST 0 (Page 29-31)</td>
<td></td>
<td></td>
<td></td>
<td>flowBOOST 2 (Page 30)</td>
</tr>
<tr>
<td>NPC</td>
<td>flowNPC 0 (Page 31)</td>
<td>flowNPC 1 (Page 32)</td>
<td>flowNPC 2 (Page 32)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MNPC</td>
<td>flowMNPC 0 (Page 33)</td>
<td>flowMNPC 1 (Page 33)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* = Example
<table>
<thead>
<tr>
<th>flowSCREW 2</th>
<th>flowSCREW 3</th>
<th>flowSCREW 4W</th>
<th>MiniSKiiP® 0 PIM (Page 13)</th>
<th>MiniSKiiP® 1 PIM (Page 14)</th>
<th>MiniSKiiP® 2 PIM (Page 15)</th>
<th>MiniSKiiP® 3 PIM (Page 16)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>MiniSKiiP® 1 PACK (Page 20-21)</td>
<td>MiniSKiiP® 2 PACK (Page 21-22)</td>
<td>MiniSKiiP® 3 PACK (Page 22)</td>
<td></td>
</tr>
<tr>
<td>flowPHASE 2</td>
<td>flowPHASE 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Page 23-24)</td>
<td>(Page 24)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>flowMNPC 4W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Page 34)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Overview

**Topology/Application**

<table>
<thead>
<tr>
<th>Topology Type</th>
<th>Industrial Drives</th>
<th>Embedded Drives</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIM</td>
<td></td>
<td>flowPIM® (Page 10-13)</td>
</tr>
<tr>
<td>PIM + PFC</td>
<td></td>
<td>flowPIM® + PFC (Page 17)</td>
</tr>
<tr>
<td>Sixpack</td>
<td></td>
<td>flowPACK (Page 18-20)</td>
</tr>
<tr>
<td>Half-Bridge</td>
<td></td>
<td>flowPHASE (Page 23-24)</td>
</tr>
<tr>
<td>H-Bridge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rectifier</td>
<td></td>
<td>flowCON (Page 26-27)</td>
</tr>
<tr>
<td>PFC</td>
<td></td>
<td>flowPFC (Page 27-28)</td>
</tr>
<tr>
<td>Solar Topologies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Booster</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPC</td>
<td></td>
<td>flowNPC (Page 31-32)</td>
</tr>
<tr>
<td>MNPC</td>
<td></td>
<td>flowMNPC (Page 33-34)</td>
</tr>
</tbody>
</table>

* = Example
<table>
<thead>
<tr>
<th>Solar Inverter</th>
<th>UPS</th>
<th>Welding</th>
<th>Power Supplies</th>
</tr>
</thead>
<tbody>
<tr>
<td>flowPIM 1 (Page 26)</td>
<td>flowPIM 1 H (Page 26)</td>
<td>fastPIM 1 (Page 26)</td>
<td></td>
</tr>
<tr>
<td>flowSOL (Page 28-29)</td>
<td>flowSOL (Page 28-29)</td>
<td>flowSOL (Page 28-29)</td>
<td></td>
</tr>
<tr>
<td>flowBOOST (Page 29-31)</td>
<td>flowBOOST (Page 29-31)</td>
<td>flowBOOST (Page 29-31)</td>
<td></td>
</tr>
<tr>
<td>flowNPC (Page 31-32)</td>
<td>flowNPC (Page 31-32)</td>
<td>flowNPC (Page 31-32)</td>
<td></td>
</tr>
<tr>
<td>flowMNPC (Page 33-34)</td>
<td>flowMNPC (Page 33-34)</td>
<td>flowMNPC (Page 33-34)</td>
<td></td>
</tr>
</tbody>
</table>
flowPIM® 0 3rd gen

- Trench Fieldstop Technology IGBT4
- Low saturation losses
- Improved EMC behavior
- Optionally with enhanced rectifier and w/o brake

Housing
- flow 0 17mm 2-clip
- flow 0 12mm 2-clip

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current (1)</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>V23990-P848-*.PM</td>
<td>1200V</td>
<td>4A</td>
<td>A48: Std. rect., 12mm</td>
</tr>
<tr>
<td>V23990-P849-*.PM</td>
<td>1200V</td>
<td>8A</td>
<td>C48: Std. rect., 12mm; w/o brake</td>
</tr>
<tr>
<td>V23990-P840-*.PM</td>
<td>1200V</td>
<td>15A</td>
<td>A49: Std. rect., 17mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C49: Std. rect., 17mm; w/o brake</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A58: Enh. rect., 12mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C58: Enh. rect., 12mm; w/o brake</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A59: Enh. rect., 17mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C59: Enh. rect., 17mm; w/o brake</td>
</tr>
</tbody>
</table>

(1) Rated current of components

flowPIM® 0 2nd gen

- IGBT3 technology for low saturation losses
- Optionally with enhanced rectifier and w/o brake

Housing
- flow 0 17mm 4-clip
- flow 0 17mm 2-clip
- flow 0 12mm 2-clip

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current (1)</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>V23990-P541-*.PM</td>
<td>600V</td>
<td>6A</td>
<td>A20: Std. rect., 17mm 4-clip</td>
</tr>
<tr>
<td>V23990-P543-*.PM</td>
<td>600V</td>
<td>10A</td>
<td>A21: Enh. rect., 17mm 4-clip C21: enh. rect., 17mm 4-clip, w/o brake</td>
</tr>
<tr>
<td>V23990-P544-*.PM</td>
<td>600V</td>
<td>15A</td>
<td>A28: Std. rect., 12mm 2-clip</td>
</tr>
<tr>
<td>V23990-P545-*.PM</td>
<td>600V</td>
<td>20A</td>
<td>A38: Enh. rect., 12mm 2-clip C38: enh. rect., 12mm 2-clip, w/o brake</td>
</tr>
<tr>
<td>V23990-P546-*.PM</td>
<td>600V</td>
<td>30A</td>
<td>A39: Enh. rect., 17mm 2-clip C39: enh. rect., 17mm 2-clip, w/o brake</td>
</tr>
<tr>
<td>V23990-P549-*.PM</td>
<td>1200V</td>
<td>8A</td>
<td>A3: Std. rect., 17mm 4-clip</td>
</tr>
<tr>
<td>V23990-P540-*.PM</td>
<td>1200V</td>
<td>15A</td>
<td>A31: Enh. rect., 17mm 4-clip C31: enh. rect., 17mm 4-clip, w/o brake</td>
</tr>
</tbody>
</table>

Downloaded from Arrow.com.
flowPIM® | 3rd gen

- Trench Fieldstop Technology IGBT4
- Low saturation losses
- Optionally with enhanced rectifier and w/o brake

Housing
- flow | 17mm
- flow | 12mm

flowPIM® | 2nd gen

- IGBT3 technology for low saturation losses
- Compact design with enhanced rectifier
- Optionally with or w/o brake

Housing
- flow | 17mm
- flow | 12mm

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current</th>
<th>Options*</th>
</tr>
</thead>
<tbody>
<tr>
<td>V23990-P588-*A41-PM</td>
<td>1200V</td>
<td>15A</td>
<td>A41: 17mm, w/o brake</td>
</tr>
<tr>
<td>V23990-P589-*A41-PM</td>
<td>1200V</td>
<td>25A</td>
<td>A418: 12mm, w/o brake</td>
</tr>
<tr>
<td>V23990-P580-*A41-PM</td>
<td>1200V</td>
<td>35A</td>
<td>C41: 17mm, w/o brake</td>
</tr>
<tr>
<td>V23990-P580-A46-PM</td>
<td>1200V</td>
<td>35A</td>
<td>C418: 12mm, w/o brake</td>
</tr>
<tr>
<td>V23990-P589-A31-PM</td>
<td>1200V</td>
<td>25A</td>
<td>With brake, improved Rth (AlN)</td>
</tr>
<tr>
<td>V23990-P580-*A41-PM</td>
<td>1200V</td>
<td>35A</td>
<td>With IGBT Phantom Speed (fsw &gt; 8kHz)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current</th>
<th>Options*</th>
</tr>
</thead>
<tbody>
<tr>
<td>V23990-P585-*A-PM</td>
<td>600V</td>
<td>30A</td>
<td>A20: 17mm, w/o brake</td>
</tr>
<tr>
<td>V23990-P586-*A-PM</td>
<td>600V</td>
<td>50A</td>
<td>A208: 12mm, w/o brake</td>
</tr>
<tr>
<td>V23990-P587-*A-PM</td>
<td>600V</td>
<td>75A</td>
<td>C20: 17mm, w/o brake</td>
</tr>
<tr>
<td>V23990-P588-*A-PM</td>
<td>1200V</td>
<td>15A</td>
<td>C208: 12mm, w/o brake</td>
</tr>
<tr>
<td>V23990-P589-*A-PM</td>
<td>1200V</td>
<td>25A</td>
<td>A: With brake</td>
</tr>
<tr>
<td>V23990-P580-*A-PM</td>
<td>1200V</td>
<td>35A</td>
<td>C: W/o brake</td>
</tr>
</tbody>
</table>

Downloaded from Arrow.com.
**flowPIM® 2 3rd gen**

- IGBT4 (1200V) technology for low saturation losses and improved EMC behavior
- IGBT3 (600V) technology for low saturation losses
- Compact and low inductive design

**Housing**
- **flow 2**

**flowPIM® 1 Enhanced**

- Ultra fast IGBTs for reduced switching losses dedicated for $f_{SW} > 8$kHz
- Typical applications: fans and pumps

**Housing**
- **flow 1 17mm**

### Part-No | Voltage | Current (1) | Comments
--- | --- | --- | ---
V23990-P763-A-PM | 600V | 50A | IGBT3
V23990-P764-A-PM | 600V | 75A | IGBT3
V23990-P765-A-PM | 600V | 100A | IGBT3
V23990-P767-A-PM | 1200V | 35A | IGBT4
V23990-P768-A-PM | 1200V | 50A | IGBT4
V23990-P769-A-PM | 1200V | 75A | IGBT4
V23990-P760-A-PM | 1200V | 100A | IGBT4

Part-No | Voltage | Current (1) | Comments
--- | --- | --- | ---
V23990-P516-C-PM | 1200V | 8A | IGBT phantom speed
V23990-P517-C-PM | 1200V | 15A | IGBT phantom speed
V23990-P518-C44-PM | 1200V | 25A | IGBT phantom speed

1) Rated current of components
### flow90PIM 1

- IGBT3 technology for low saturation losses
- Supports designs with 90° mounting angle between heatsink and PCB
- Clip-in PCB mounting
- Clip or screw-on heatsink mounting

### Housing
- flow90 1

### MiniSKiiP® 0 PIM

- Solderless spring contact mounting system
- IGBT4 (1200V) technology for low saturation losses and improved EMC behavior
- IGBT3 (600V) technology for low saturation losses
- Optional with 2-leg rectifier (600V)

### Housing
- MiniSKiiP® 0

---

### Part-Number Table

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>V23990-P631-A-PM</td>
<td>600V</td>
<td>8A</td>
<td>IGBT3</td>
</tr>
<tr>
<td>V23990-P632-A-PM</td>
<td>600V</td>
<td>10A</td>
<td></td>
</tr>
<tr>
<td>V23990-P633-A-PM</td>
<td>600V</td>
<td>15A</td>
<td></td>
</tr>
<tr>
<td>V23990-P634-A-PM</td>
<td>600V</td>
<td>20A</td>
<td></td>
</tr>
<tr>
<td>V23990-P635-A-PM</td>
<td>600V</td>
<td>30A</td>
<td></td>
</tr>
<tr>
<td>V23990-P636-A-PM</td>
<td>1200V</td>
<td>8A</td>
<td></td>
</tr>
<tr>
<td>V23990-P637-A-PM</td>
<td>1200V</td>
<td>15A</td>
<td></td>
</tr>
</tbody>
</table>

---

### Part-Number Table

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>80-M006PNB006SA-K614C</td>
<td>600V</td>
<td>6A</td>
<td>3-leg rectifier, equivalent SKiiP 01NAC066V3</td>
</tr>
<tr>
<td>80-M006PNB006SA01-K614D</td>
<td>600V</td>
<td>6A</td>
<td>2-leg rectifier, equivalent SKiiP 01NEC066V3</td>
</tr>
<tr>
<td>80-M006PNB010SA-K615C</td>
<td>600V</td>
<td>10A</td>
<td>3-leg rectifier, equivalent SKiiP 02NAC066V3</td>
</tr>
<tr>
<td>80-M006PNB010SA01-K615D</td>
<td>600V</td>
<td>10A</td>
<td>2-leg rectifier, equivalent SKiiP 02NEC066V3</td>
</tr>
<tr>
<td>80-M012PNB008SC-K619C41</td>
<td>1200V</td>
<td>8A</td>
<td>3-leg rectifier, equivalent SKiiP 03NAC12T4V1</td>
</tr>
</tbody>
</table>
### MiniSKiiP® I PIM

**IGBT4**

- Trench Fieldstop IGBT4 technology
- Solderless spring contact mounting system

**Housing**

- MiniSKiiP®

---

#### MiniSKiiP® I PIM

**IGBT3**

- Trench Fieldstop IGBT3 for low saturation losses
- Solderless spring contact mounting system

**Housing**

- MiniSKiiP®

---

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>V23990-K209-A40-PM</td>
<td>1200V</td>
<td>8A</td>
<td>Equivalent: SKiiP 11 NAB 12T4V1</td>
</tr>
<tr>
<td>V23990-K200-A40-PM</td>
<td>1200V</td>
<td>15A</td>
<td>Equivalent: SKiiP 12 NAB 12T4V1</td>
</tr>
</tbody>
</table>

1) Rated current of components

---

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>V23990-K201-A-PM</td>
<td>600V</td>
<td>6A</td>
<td>Equivalent: SKiiP 11 NAB 066 V1</td>
</tr>
<tr>
<td>V23990-K202-A-PM</td>
<td>600V</td>
<td>10A</td>
<td>Equivalent: SKiiP 12 NAB 066 V1</td>
</tr>
<tr>
<td>V23990-K203-A-PM</td>
<td>600V</td>
<td>15A</td>
<td>Equivalent: SKiiP 13 NAB 066 V1</td>
</tr>
<tr>
<td>V23990-K204-A10-PM</td>
<td>600V</td>
<td>20A</td>
<td>Equivalent: SKiiP 14 NAB 066 V1</td>
</tr>
<tr>
<td>V23990-K209-A-PM</td>
<td>1200V</td>
<td>8A</td>
<td>Equivalent: SKiiP 11 NAB 126 V1</td>
</tr>
<tr>
<td>V23990-K200-A-PM</td>
<td>1200V</td>
<td>15A</td>
<td>Equivalent: SKiiP 12 NAB 126 V1</td>
</tr>
<tr>
<td>V23990-K200-A10-PM</td>
<td>1200V</td>
<td>15A</td>
<td>With high speed FRED</td>
</tr>
</tbody>
</table>

---

Downloaded from Arrow.com.
### MiniSKiiP® 2 PIM

- **IGBT4**
  - Trench Fieldstop IGBT4 technology
  - Solderless spring contact mounting system

#### Housing
- MiniSKiiP® 2

---

### MiniSKiiP® 2 PIM

- **IGBT3**
  - Trench Fieldstop IGBT3 for low saturation losses
  - Solderless spring contact mounting system

#### Housing
- MiniSKiiP® 2

---

#### Part-Number Table

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>V23990-K229-A40-PM</td>
<td>1200V</td>
<td>25A</td>
<td>Equivalent: SKiP 23NAB12T4V1</td>
</tr>
<tr>
<td>V23990-K220-A40-PM</td>
<td>1200V</td>
<td>35A</td>
<td>Equivalent: SKiP 24NAB12T4V1</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>V23990-K222-A-PM</td>
<td>600V</td>
<td>30A</td>
<td>Equivalent: SKiP 25 NAB 066 V1</td>
</tr>
<tr>
<td>V23990-K223-A-PM</td>
<td>600V</td>
<td>50A</td>
<td>Equivalent: SKiP 26 NAB 066 V1</td>
</tr>
<tr>
<td>V23990-K229-A-PM</td>
<td>1200V</td>
<td>25A</td>
<td>Equivalent: SKiP 23 NAB 126 V1</td>
</tr>
<tr>
<td>V23990-K229-A10-PM</td>
<td>1200V</td>
<td>25A</td>
<td>With high speed FRED</td>
</tr>
<tr>
<td>V23990-K220-A-PM</td>
<td>1200V</td>
<td>35A</td>
<td>Equivalent: SKiP 24 NAB 126 V1</td>
</tr>
</tbody>
</table>
**MiniSKiiP® 3 PIM**

- Trench Fieldstop IGBT4 technology
- Solderless spring contact mounting system

**Housing**
- MiniSKiiP® 3

---

**MiniSKiiP® 3 PIM**

- Trench Fieldstop IGBT3 for low saturation losses
- Solderless spring contact mounting system

**Housing**
- MiniSKiiP® 3

---

## Part-No Voltage Current | Comments
---|---
V23990-K242-A-PM | 600V | 75A | Equivalent: SKiiP 37 NAB 066 V1
V23990-K243-A-PM | 600V | 100A | Equivalent: SKiiP 38 NAB 066 V1
V23990-K249-A-PM | 1200V | 50A | Equivalent: SKiiP 35 NAB 126 V1
V23990-K240-A-PM | 1200V | 70A | Equivalent: SKiiP 38 NAB 126 V1

---

1) Rated current of components
## PIM with PFC

### flowPIM® 0 + PFC
- PIM module with CoolMOS PFC inverter
- PFC switching frequency up to 200kHz
- Inverter part with IGBT3 technology
- Clip-in PCB mounting

#### Housing
- flow 0 17mm 4-clip
- flow 0 17mm 2-clip

### flowPIM® 1 + PFC
- PFC switching frequency up to 200kHz
- Inverter part with IGBT2 technology
- With inverter high side shunt for short circuit detection

#### Housing
- flow 1 17mm

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>V23990-P371-B10-PM</td>
<td>600V</td>
<td>4A</td>
<td>B10: 4-clip housing</td>
</tr>
<tr>
<td>V23990-P372-B10-PM</td>
<td>600V</td>
<td>6A</td>
<td>B17: 4-clip housing, w/o PFC shunt</td>
</tr>
<tr>
<td>V23990-P373-*-PM</td>
<td>600V</td>
<td>10A</td>
<td>B19: 2-clip housing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>V23990-P303-B-PM</td>
<td>600V</td>
<td>10A</td>
<td></td>
</tr>
<tr>
<td>V23990-P304-B-PM</td>
<td>600V</td>
<td>15A</td>
<td></td>
</tr>
<tr>
<td>V23990-P305-B-PM</td>
<td>600V</td>
<td>20A</td>
<td></td>
</tr>
</tbody>
</table>
### flowPM 1B
- Rectifier, PFC, three-phase inverter
- Integrated DC capacitor
- Current sensing with laser trimmed shunts
- Complete gate drive circuit (incl. bootstrap)
- Temperature sensor

### Housing
- **flow 1B**

---

### SIXPACK

#### flowPACK 0 3rd gen
- Trench Fieldstop Technology IGBT3 (600V)
- Trench Fieldstop Technology IGBT4 (1200V)
- Low saturation losses and improved EMC behavior

### Housing
- **flow 0 17mm 2-clip**
- **flow 0 12mm 2-clip**

---

#### Part-No | Voltage | Current | Options
--- | --- | --- | ---
V23990-P861-*-PM | 600V | 10A | SiC PFC diode
V23990-P862-*-PM | 600V | 15A | SiC PFC diode
V23990-P863-*-PM | 600V | 20A |
V23990-P864-*-PM | 600V | 30A |
V23990-P865-*-PM | 600V | 50A |
V23990-P866-*-PM | 600V | 75A |
V23990-P867-*-PM | 1200V | 8A |
V23990-P868-*-PM | 1200V | 15A |
V23990-P869-*-PM | 1200V | 25A |
V23990-P860-*-PM | 1200V | 35A |

---

1) Rated current of components

---

Downloaded from Arrow.com.
flowPACK 1

- Trench Fieldstop Technology IGBT3 (600V)
- Trench Fieldstop Technology IGBT4 (1200V)
- Low saturation losses and improved EMC behavior
- Compact design

Housing
- flow 1 17mm

flowPACK 2

- Trench Fieldstop Technology IGBT4
- Low saturation losses
- Improved EMC behavior
- Compact and low inductive design

Housing
- flow 2

### Part-No Voltage Current Options

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current</th>
<th>Options*</th>
</tr>
</thead>
<tbody>
<tr>
<td>V23990-P823-*-PM</td>
<td>600V</td>
<td>50A</td>
<td></td>
</tr>
<tr>
<td>V23990-P824-*-PM</td>
<td>600V</td>
<td>75A</td>
<td></td>
</tr>
<tr>
<td>V23990-P825-*-PM</td>
<td>600V</td>
<td>100A</td>
<td></td>
</tr>
<tr>
<td>V23990-P828-*-PM</td>
<td>1200V</td>
<td>35A</td>
<td></td>
</tr>
<tr>
<td>V23990-P829-*-PM</td>
<td>1200V</td>
<td>50A</td>
<td></td>
</tr>
</tbody>
</table>

- F: Improved $R_{th}$ (AlN DCB)
- F10: Std. version

### Part-No Voltage Current Options

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>V23990-P688-F-PM</td>
<td>1200V</td>
<td>75A</td>
<td></td>
</tr>
<tr>
<td>V23990-P689-F-PM</td>
<td>1200V</td>
<td>100A</td>
<td></td>
</tr>
<tr>
<td>V23990-P680-F-PM</td>
<td>1200V</td>
<td>150A</td>
<td></td>
</tr>
</tbody>
</table>
Part-No | Voltage | Current | Options
---|---|---|---
V23990-P704-F-PM | 600V | 30A | 
V23990-P705-F-PM | 600V | 50A | 
V23990-P706-F-PM | 600V | 75A | 
V23990-P708-F-PM | 1200V | 15A | 
V23990-P709-F-PM | 1200V | 25A | 
V23990-P700-F-PM | 1200V | 35A | 

Part-No | Voltage | Current | Comments
---|---|---|---
V23990-K218-F40-PM | 1200V | 8A | Equivalent: SKiiiP 11 AC 12T4 V1
V23990-K219-F40-PM | 1200V | 15A | Equivalent: SKiiiP 12 AC 12T4 V1
V23990-K210-F40-PM | 1200V | 25A | Equivalent: SKiiiP 13 AC 12T4 V1
### MiniSKiiP® 1 PACK

- Trench Fieldstop IGBTs for low saturation voltage
- Solderless spring contact mounting system

#### Housing
- MiniSKiiP® 1

#### Trench Fieldstop IGBTs for low saturation voltage

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>V23990-K218-F-PM</td>
<td>1200V</td>
<td>8A</td>
<td>Equivalent: SKiiP 11 AC 126 V1</td>
</tr>
<tr>
<td>V23990-K219-F-PM</td>
<td>1200V</td>
<td>15A</td>
<td>Equivalent: SKiiP 12 AC 126 V1</td>
</tr>
<tr>
<td>V23990-K210-F-PM</td>
<td>1200V</td>
<td>25A</td>
<td>Equivalent: SKiiP 13 AC 126 V1</td>
</tr>
</tbody>
</table>

### MiniSKiiP® 2 PACK

- Trench Fieldstop IGBT4 Technology
- Solderless spring contact mounting system

#### Housing
- MiniSKiiP® 2

#### Trench Fieldstop IGBT4 Technology

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>V23990-K238-F40-PM</td>
<td>1200V</td>
<td>35A</td>
<td>Equivalent: SKiiP 24 AC 12T4 V1</td>
</tr>
<tr>
<td>V23990-K239-F40-PM</td>
<td>1200V</td>
<td>50A</td>
<td>Equivalent: SKiiP 25 AC 12T4 V1</td>
</tr>
<tr>
<td>V23990-K230-F40-PM</td>
<td>1200V</td>
<td>70A</td>
<td>Equivalent: SKiiP 26 AC 12T4 V1</td>
</tr>
</tbody>
</table>
### MiniSKiiP® 2 PACK

- Trench Fieldstop IGBTs for low saturation losses
- Solderless spring contact mounting system

#### Housing
- MiniSKiiP® 2

#### MiniSKiiP® 3 PACK

- Trench Fieldstop IGBT Technology
- Solderless spring contact mounting system

#### Housing
- MiniSKiiP® 3

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>V23990-K232-F-PM</td>
<td>600V</td>
<td>50A</td>
<td>Equivalent: SKiiP 26 AC 066V1</td>
</tr>
<tr>
<td>V23990-K233-F-PM</td>
<td>600V</td>
<td>75A</td>
<td>Equivalent: SKiiP 27 AC 066V1</td>
</tr>
<tr>
<td>V23990-K305-F-PM</td>
<td>600V</td>
<td>100A</td>
<td>Equivalent: SKiiP 28 AC 066V1</td>
</tr>
<tr>
<td>V23990-K238-F-PM</td>
<td>1200V</td>
<td>35A</td>
<td>Equivalent: SKiiP 24 AC 126V1</td>
</tr>
<tr>
<td>V23990-K239-F-PM</td>
<td>1200V</td>
<td>50A</td>
<td>Equivalent: SKiiP 25 AC 126V1</td>
</tr>
<tr>
<td>V23990-K230-F-PM</td>
<td>1200V</td>
<td>70A</td>
<td>Equivalent: SKiiP 26 AC 126V1</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>V23990-K438-F40-PM</td>
<td>1200V</td>
<td>70A</td>
<td>Equivalent: SKiiP 37 AC 12 T4V1</td>
</tr>
<tr>
<td>V23990-K439-F40-PM</td>
<td>1200V</td>
<td>100A</td>
<td>Equivalent: SKiiP 38 AC 12 T4V1</td>
</tr>
<tr>
<td>V23990-K430-F40-PM</td>
<td>1200V</td>
<td>150A</td>
<td>Equivalent: SKiiP 39 AC 12 T4V1</td>
</tr>
</tbody>
</table>

---

1) Rated current of components
**HALF-BRIDGE**

**flowPHASE 0 2nd gen**
- Trench Fieldstop Technology IGBT3 (600V)
- Trench Fieldstop Technology IGBT4 (1200V)
- Low saturation losses and improved EMC behavior
- Clip-in PCB mounting
- Available with Press-fit pins

**Housing**
- **flow 0 17mm 2-clip**
- **flow 0 12mm 2-clip**

**flowPHASE 2 1st gen**
- Trench Fieldstop Technology IGBT3
- Low saturation losses and improved EMC behavior
- Reliable solder and screw contacts

**Housing**
- **flowSCREW 2**

---

### Part-Number Table

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current</th>
<th>Comments</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-Fx°062PA075SAX²-P993Fx²</td>
<td>600V</td>
<td>75A</td>
<td></td>
<td>IGBT3</td>
</tr>
<tr>
<td>10-Fx°062PA100SAX²-P994Fx²</td>
<td>600V</td>
<td>100A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-Fx°062PA150SAX²-P995Fx²</td>
<td>600V</td>
<td>150A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-Fx°062PA200SAX²-P996Fx²</td>
<td>600V</td>
<td>200A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-Fx°122PA050SCTX²-P997Fx²</td>
<td>1200V</td>
<td>50A</td>
<td></td>
<td>IGBT4, fsw &lt; 8kHz</td>
</tr>
<tr>
<td>10-Fx°122PA075SCTX²-P998Fx²</td>
<td>1200V</td>
<td>75A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-Fx°122PA100SCTX²-P999Fx²</td>
<td>1200V</td>
<td>100A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-Fx°122PA150SCTX²-P990Fx²</td>
<td>1200V</td>
<td>150A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-Fx°122PA100FSX²-P999Fx²</td>
<td>1200V</td>
<td>100A</td>
<td></td>
<td>IGBT2 phantom, fsw &lt; 25kHz</td>
</tr>
<tr>
<td>10-Fx°122PA100FCX²-P999Fx²</td>
<td>1200V</td>
<td>100A</td>
<td></td>
<td>IGBT2 fast, fsw &lt; 50kHz</td>
</tr>
</tbody>
</table>

---

Downloaded from Arrow.com.
Trench Fieldstop Technology IGBT3 (600V)
Trench Fieldstop Technology IGBT4 (1200V)
Low saturation losses and improved EMC behavior
Low resistive high current path
Low inductive transient current path
Reliable solder and screw contacts

Housing
flowSCREW 2

Part-No | Voltage | Current | Comments
---|---|---|---
70-S2062PA3005A-P815F | 600V | 300A | 30kW / 20kHz, IGBT3
70-S2062PA4005A-P816F | 600V | 400A | 40kW / 20kHz, IGBT3
70-S2122PA2000F-P818F20 | 1200V | 200A | 40kW / 20kHz, IGBT2 phantom
70-S2122PA2000C-P818F | 1200V | 200A | 40kW / 8kHz, IGBT4
70-S2122PA3000C-P819F | 1200V | 300A | 60kW / 8kHz, IGBT4

flowPHASE 2 Low Ind

Part-No | Voltage | Current | Options
---|---|---|---
V23990-P669-F02-PM | 1200V | 300A | 
V23990-P660-F02-PM | 1200V | 450A | 

1) Rated current of components
### fastPACK 0 H

- Ultra low inductive design
- Ultra high switching frequency
- Clip-in PCB mounting
- Available with Press-fit pins

#### Housing
- Flow 0.17mm 4-clip
- Flow 0.12mm 2-clip

### fastPACK 0 H with capacitors

- Ultra low inductive design
- Integrated capacitor
- Ultra high switching frequency
- Clip-in PCB mounting
- Available with Press-fit pins

#### Housing
- Flow 0.17mm 4-clip
- Flow 0.12mm 2-clip

### Part-Number Table

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>V23990-P622-F64-PM</td>
<td>600V</td>
<td>30A</td>
<td>CoolMOS, fsw &lt; 400kHz</td>
</tr>
<tr>
<td>V23990-P622-F74-PM</td>
<td>600V</td>
<td>30A</td>
<td>CoolMOS, fsw &lt; 400kHz, improved Rth (AlN)</td>
</tr>
<tr>
<td>V23990-P623-F04-PM</td>
<td>600V</td>
<td>60A</td>
<td>IGBT2 fast, fsw &lt; 100kHz</td>
</tr>
<tr>
<td>V23990-P623-F14-PM</td>
<td>600V</td>
<td>60A</td>
<td>IGBT2 fast, fsw &lt; 100kHz, improved Rth (AlN)</td>
</tr>
<tr>
<td>V23990-P623-F24-PM</td>
<td>600V</td>
<td>50A</td>
<td>IGBT2 fast, fsw &lt; 100kHz, improved Rth (AlN)</td>
</tr>
<tr>
<td>V23990-P624-F24-PM</td>
<td>600V</td>
<td>75A</td>
<td>IGBT3, fsw &lt; 30kHz</td>
</tr>
<tr>
<td>V23990-P625-F24-PM</td>
<td>600V</td>
<td>100A</td>
<td></td>
</tr>
<tr>
<td>V23990-P628-F64-PM</td>
<td>900V</td>
<td>26A</td>
<td>CoolMOS C3, 120mOhm, fsw &lt; 250kHz, H-bridge</td>
</tr>
<tr>
<td>V23990-P629-F44-PM</td>
<td>1200V</td>
<td>25A</td>
<td>IGBT2 phantom, fsw &lt; 50kHz</td>
</tr>
<tr>
<td>V23990-P629-F46-PM</td>
<td>1200V</td>
<td>25A</td>
<td>IGBT2 phantom, fsw &lt; 50kHz, hyper fast diodes</td>
</tr>
<tr>
<td>V23990-P629-F54-PM</td>
<td>1200V</td>
<td>25A</td>
<td>IGBT2 phantom, fsw &lt; 50kHz, improved Rth (AlN)</td>
</tr>
<tr>
<td>V23990-P629-F56-PM</td>
<td>1200V</td>
<td>25A</td>
<td>IGBT2 phantom, fsw &lt; 50kHz, improved Rth (AlN), hyper fast diodes</td>
</tr>
</tbody>
</table>

---

### H-BRIDGE

P622 + P628
P623 + P629
P722
P723 + P729

---

Downloaded from Arrow.com.
H-BRIDGE

- Ultra high switching frequency
- Ultra low inductive design

Housing
- **flow 1 17mm**

![H-BRIDGE Circuit Diagram](image)

---

RECTIFIER

**flowCON 0**

- Modular input rectifier
- Optionally half controlled
- Compatible with flowPHASE and flowPACK
- Combines P590 and P600 to a three-phase rectifier

Housing
- **flow 0 17mm 4-clip**

![RECTIFIER Circuit Diagram](image)

---

**Part-No** | **Voltage** | **Current** | **Options**
---|---|---|---
V23990-P649-*-PM | 1600V | 50A | G: Standard rectifier, with brake
V23990-P640-*-PM | 1600V | 75A | G: Standard rectifier, with brake
V23990-P590-J09-PM | 1600V | 105A | H: Half controlled rectifier, w/o brake
V23990-P590-J19-PM | 1600V | 78A | H: Half controlled rectifier
V23990-P600-I09-PM | 1600V | 105A | Standard rectifier
V23990-P600-I19-PM | 1600V | 78A | Half controlled rectifier

---

1) Rated current of components

Downloaded from Arrow.com.
**flow90CON 1**

- Input rectifier optionally half controlled
- Compatible with flow90PACK 1
- Clip-in PCB mounting
- Clip or screw-on heatsink mounting

**flow90CON 1**

**Input rectifier optionally half controlled**
- Compatible with flow90PACK 1
- Clip-in PCB mounting
- Clip or screw-on heatsink mounting

**Housing**
- flow90 1

**flow90CON 1**

**Input rectifier optionally half controlled**
- Compatible with flow90PACK 1
- Clip-in PCB mounting
- Clip or screw-on heatsink mounting

**Housing**
- flow90 1

---

**Part-No** | **Voltage** | **Current** | **Options**
---| ---| ---| ---
V23990-P717-G*-PM | 1600V | 35A | G: Standard rectifier, with brake
V23990-P718-G*-PM | 1600V | 50A | G10: Enhanced rectifier, with brake
V23990-P719-G*-PM | 1600V | 75A | H: Standard rectifier, w/o brake
H10: Enhanced rectifier, w/o brake

---

**Part-No** | **Voltage** | **Current** | **Options**
---| ---| ---| ---
V23990-P802-D*-PM | 500V | 15A | CooIMOS™ + tandem diode
V23990-P803-D*-PM | 500V | 28A | CooIMOS™ + tandem diode
V23990-P804-D*-PM | 600V | 30A | High speed IGBT + tandem diode
V23990-P800-D*-PM | 600V | 34A | CooIMOS™ + SiC diode
V23990-P804-D30-PM | 600V | 36A | High speed IGBT + tandem diode, enhanced rectifier

---

**Housing**
- flow 0 17mm 4-clip

---

**flowPFC 0 1st gen**

- High power, high efficiency PFC circuit
- Optionally half controlled
- Up to 400kHz switching frequency
- Integrated high frequency capacitors

**flowPFC 0 1st gen**

- High power, high efficiency PFC circuit
- Optionally half controlled
- Up to 400kHz switching frequency
- Integrated high frequency capacitors

**Housing**
- flow 0 17mm 4-clip
flowPFC 0 2nd gen

- Compact and low inductance design
- Suitable for interleaved topology
- Suitable for current sensing in collector or in emitter
- PFC for welding, SMPS, motor drives, UPS, chargers
- Available with Press-fit pins

Housing
- flow 0 17mm 2-clip
- flow 0 12mm 2-clip

flowPFC 0 2nd gen

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current 1)</th>
<th>Comments</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-F0062TA099FH02-P897E</td>
<td>600V</td>
<td>20A</td>
<td>CoolMOS™ + SiC</td>
<td>With SCR, current sense in emitter</td>
</tr>
<tr>
<td>10-F0062TA099FH-P897D</td>
<td>600V</td>
<td>25A</td>
<td>CoolMOS™ + SiC</td>
<td>Default: W/o SCR, current sense in collector</td>
</tr>
<tr>
<td>10-F0062JUA03F-P98x</td>
<td>600V</td>
<td>30A</td>
<td>Parallel switch: CoolMOS™ // PT IGBT + STEALTH™ II</td>
<td>0: With SCR, current sense in collector</td>
</tr>
<tr>
<td>10-F0062TA030FB-P98x</td>
<td>600V</td>
<td>30A</td>
<td>High speed IGBT2 + STEALTH™ II</td>
<td>1: With SCR, current sense in collector</td>
</tr>
<tr>
<td>10-F0062JUA04F-P98x</td>
<td>600V</td>
<td>40A</td>
<td>Parallel switch: CoolMOS™ // PT IGBT + STEALTH™ II</td>
<td>2: With SCR, current sense in collector</td>
</tr>
<tr>
<td>10-F0062TA040FB-P98x</td>
<td>600V</td>
<td>50A</td>
<td>High speed IGBT2 + STEALTH™ II</td>
<td>3: With SCR, current sense in collector</td>
</tr>
</tbody>
</table>

Part-No | Voltage | Current 1) | Comments |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10-F0062TA045FH-P987E</td>
<td>600V</td>
<td>20A</td>
<td>45 mOhm (boost + H-bridge) + SiC in boost and H-bridge</td>
</tr>
<tr>
<td>10-F0062TA045FH01-P987E10</td>
<td>600V</td>
<td>20A</td>
<td>45 mOhm (boost + H-bridge) + SiC in boost</td>
</tr>
<tr>
<td>10-F0062TA045FH02-P987D</td>
<td>600V</td>
<td>20A</td>
<td>45 mOhm (boost + H-bridge) + SiC in boost and H-bridge, open emitter</td>
</tr>
<tr>
<td>10-F0062TA070FS-P984E</td>
<td>600V</td>
<td>12A</td>
<td>70 mOhm (boost + H-bridge) + SiC in boost and H-bridge</td>
</tr>
<tr>
<td>10-F0062TA099FS-P989E</td>
<td>600V</td>
<td>10A</td>
<td>99 mOhm (boost + H-bridge) + SiC in boost and H-bridge</td>
</tr>
</tbody>
</table>

1) Rated current of components

Downloaded from Arrow.com.
flowSOL 0
Transformerbased, Single Phase

- High efficiency, CoolMOS™ + SiC diode
- Ultra high switching frequency
- Use FZ06RIA045FH with FZ06BIA083FI or V23990-P628-F64-PM

Housing
- flow 0 12mm 2-clip

Part-No | Voltage | Current | Comments
--- | --- | --- | ---
10-FZ06BIA083FI-P915L | 600V | 12A | Dual boost + 45mOhm, SiC diodes
10-FZ06RIA045FH-P910D | 600V | 20A | Secondary, ultra fast rectifier + 45mOhm, SiC highside rectifier
10-FZ06RIA045FH01-P910D10 | 600V | 20A | Secondary, ultra fast rectifier + 45mOhm, STEALTH™ II highside rectifier
V23990-P628-F64-PM | 900V | 26A | Primary, CoolMOS™ C3 120mOhm, fsw < 250kHz, parallel boost

FLOWBOOST 0
Symmetric with bypass diodes

- High efficiency symmetric boost
- Dedicated designs for solar and UPS applications
- Ultra high switching frequency
- Use together with flowNPC 0

Housing
- flow 0 12mm 2-clip

Part-No | Voltage | Current | Comments
--- | --- | --- | ---
10-FZ06BIA083FI-P915L | 600V | 35A | Dual boost + 45mOhm, SiC diodes

* Without booster
1) Rated current of components

**High efficiency symmetric boost**

**Dedicated designs for solar and UPS applications**

**Ultra high switching frequency**

**Use together with flowNPC 0**

**Housing**

**flow 0 12mm 2-clip**

---

**Part –No** | **Voltage** | **Current** | **Comments**
---|---|---|---
10-FZ06NBA075SA-P916L33 | 600V | 75A | IGBT3
10-FZ06NBA050SA-P915L33 | 600V | 50A | IGBT3
10-FZ06NBA030SA-P914L33 | 600V | 30A | IGBT3
10-FZ06NBA110FP10-M306L18 | 600V | 110A | Dual boost, 110A, parallel switch, ultra fast diode
10-FZ06NBA110FP-M306L28 | 600V | 110A | Dual boost, 110A, parallel switch, SiC diode
10-FZ06NBA084FP10-M306L38 | 600V | 84A | Dual boost, 84A, parallel switch, ultra fast diode
10-FZ06NBA084FP-M306L48 | 600V | 84A | Dual boost, 84A, parallel switch, SiC diode

---

**Part –No** | **Voltage** | **Current** | **Comments**
---|---|---|---
30-F206NBA0200SA-M235L33 | 600V | 200A | Dual boost, 200A, IGBT3
30-F206NBA200SG-M235L25 | 600V | 200A | Dual boost, 200A, IGBT3 high speed
30-F206NBA200FP-M235L | 600V | 200A | Dual boost, 200A, parallel switch

---

1) Rated current of components
flowBOOST 0
Dual

- 2x900V/120mOhm CoolMOS-C3 or
- 2x1200V/64A highspeed IGBT or
- 4X100mOhm SiC JFET
- 1200V SiC diodes
- Bypass rectifier

Housing
- flow 0 12mm 2-clip

---

flowNPC 0

- High efficiency three-level half-bridge (2 x 600V = 1200V)
- Dedicated designs for solar and UPS applications
- Ultra high switching frequency
- Compatible with flowBOOST 0 Symmetric

Housing
- flow 0 12mm 2-clip

---

<table>
<thead>
<tr>
<th>Part –No</th>
<th>Voltage</th>
<th>Current</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>V23990-P621-F68-PM</td>
<td>900V</td>
<td>2x120mOhm</td>
<td>CoolMOS-C3 + SiC, bypass diode</td>
</tr>
<tr>
<td>V23990-P629-F62-PM</td>
<td>1200V</td>
<td>2x64A</td>
<td>Ultra fast IGBT + SiC diodes, bypass diode</td>
</tr>
<tr>
<td>V23990-P629-F72-PM</td>
<td>1200V</td>
<td>2x64A</td>
<td>Ultra fast IGBT + STEALTH™ II diodes, bypass diode</td>
</tr>
<tr>
<td>10-PZ12B2A025FN-M330L08Y</td>
<td>1200V</td>
<td>2 X 80A</td>
<td>4x100mOhm SiC JFET + SiC diode</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Part –No</th>
<th>Voltage</th>
<th>Current</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-FZ06NRA045FH-P965F</td>
<td>600V</td>
<td>30A</td>
<td>CoolMOS CP + IGBT3, SiC diodes + reactive power</td>
</tr>
<tr>
<td>10-FZ06NRA045FH01-P965SF10</td>
<td>600V</td>
<td>30A</td>
<td>CoolMOS CP + IGBT3, STEALTH™ II diodes, reactive power</td>
</tr>
<tr>
<td>10-FZ06NPA045FP-P967F</td>
<td>600V</td>
<td>50A</td>
<td>Parallel switch (CoolMOS + IGBT PT) SiC diodes, reactive power</td>
</tr>
<tr>
<td>10-FZ06NPA045FP01-P967F10</td>
<td>600V</td>
<td>50A</td>
<td>Parallel switch (CoolMOS + IGBT PT) STEALTH™ II diodes, reactive power</td>
</tr>
<tr>
<td>10-FZ06NPA070FP-P969F</td>
<td>600V</td>
<td>70A</td>
<td>Parallel switch (CoolMOS + IGBT PT) SiC diodes, reactive power</td>
</tr>
<tr>
<td>10-FZ06NPA070FP01-P969F10</td>
<td>600V</td>
<td>70A</td>
<td>Parallel switch (CoolMOS + IGBT PT) STEALTH™ II diodes, reactive power</td>
</tr>
<tr>
<td>10-FZ06NRA045FH-P925F</td>
<td>600V</td>
<td>75A</td>
<td>CoolMOS CP + IGBT3 + SiC diodes</td>
</tr>
<tr>
<td>10-FZ06NRA045FH01-P925F10</td>
<td>600V</td>
<td>75A</td>
<td>CoolMOS CP + IGBT3 + STEALTH™ diodes</td>
</tr>
<tr>
<td>10-FZ06NIA030SA-P924F33</td>
<td>600V</td>
<td>30A</td>
<td>IGBT3</td>
</tr>
<tr>
<td>10-FZ06NIA050SA-P925F33</td>
<td>600V</td>
<td>50A</td>
<td>IGBT3</td>
</tr>
<tr>
<td>10-FZ06NIA075SA-P926F33</td>
<td>600V</td>
<td>75A</td>
<td>IGBT3</td>
</tr>
</tbody>
</table>
### flowNPC 1

- High efficiency three-level half-bridge (2 x 600V = 1200V)
- Trench Fieldstop Technology IGBT3
- Low inductance layout
- For solar, UPS and motor drives

**Housing**
- flow 1 17mm

<table>
<thead>
<tr>
<th>Part No</th>
<th>Voltage</th>
<th>Current</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-F206NIA075SA05-M245F31</td>
<td>600V</td>
<td>75A</td>
<td>IGBT3</td>
</tr>
<tr>
<td>30-F206NIA150SA-M104F20</td>
<td>600V</td>
<td>150A</td>
<td>IGBT3</td>
</tr>
<tr>
<td>30-F206NIA200SA-M105F</td>
<td>600V</td>
<td>200A</td>
<td>IGBT3</td>
</tr>
<tr>
<td>30-F206NIA200SG-M105F25</td>
<td>600V</td>
<td>200A</td>
<td>IGBT3 high speed 3</td>
</tr>
<tr>
<td>30-F206NIA300SA-M106F</td>
<td>600V</td>
<td>300A</td>
<td>IGBT3</td>
</tr>
</tbody>
</table>

1) Rated current of components

### flowNPC 2

- High efficiency three-level half-bridge (2 x 600V = 1200V)
- Trench Fieldstop Technology IGBT3
- Low inductance layout
- For solar, UPS and motor drives
- Compatible with flowBOOST 2 Symmetric

**Housing**
- flow 2

<table>
<thead>
<tr>
<th>Part No</th>
<th>Voltage</th>
<th>Current</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-F106NIA100SA-M135F</td>
<td>600V</td>
<td>100A</td>
<td>IGBT3</td>
</tr>
<tr>
<td>10-F106NIA150SA-M136F</td>
<td>600V</td>
<td>150A</td>
<td>IGBT3</td>
</tr>
</tbody>
</table>
### flowMNPC 0

- High efficiency three-level half-bridge
- Dedicated designs for solar and UPS applications
- Ultra high switching frequency
- Compatible with flowBOOST 0

**Housing**
- flow 0 12mm 2-clip

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-FZ12NMA080SH-M269</td>
<td>1200V</td>
<td>80A</td>
<td>IGBT4 high speed 3</td>
</tr>
<tr>
<td>10-PZ12NMA025FN-M340F08Y</td>
<td>1200V</td>
<td>80A</td>
<td>4x100mOhm SiC JFET</td>
</tr>
</tbody>
</table>

### flowMNPC 1

- High efficiency three-level half-bridge
- Dedicated designs for solar and UPS applications
- Ultra high switching frequency

**Housing**
- flow 1 12mm

<table>
<thead>
<tr>
<th>Part-No</th>
<th>Voltage</th>
<th>Current</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-F112NMA160SH-M420</td>
<td>1200V</td>
<td>160A</td>
<td>IGBT4 high speed 3</td>
</tr>
</tbody>
</table>
High efficient three-phase mixed voltage NPC
Low stray inductance with integrated DC snubber capacitors
Screw terminals
Dedicated for high efficient solar and UPS applications

Housing
flowSCREW 4W

Part – No Voltage Current Comments
70-W612M3A600SC-M200E 1200V 600A IGBT4
70-W612M3A400SC-M209E 1200V 400A IGBT4
70-W612M3A300SC-M208E 1200V 300V IGBT4

Part – No Voltage Current Comments
70-W624N3A320SH-M400E 2400V 400A IGBT4-HS3

1) Rated current of components
Housing Dimensions:

**flow 0 17mm 2-clip**

Housing Dimensions:
- Height: 17mm
- Length: 66mm
- Width: 33mm

**flow 0 12mm 2-clip**

Housing Dimensions:
- Height: 12mm
- Length: 66mm
- Width: 33mm
Housing Dimensions:
Height: 17mm
Length: 66mm
Width: 33mm

Housing Dimensions:
Height: 12mm
Length: 82mm
Width: 38mm
flow 1 17mm

Housing Dimensions:
Height: 17mm
Length: 82mm
Width: 38mm

flow 1B

Housing Dimensions:
Height: 16mm
Length: 72mm
Width: 36mm
Housing Dimensions:
Height: 17mm
Length: 108mm
Width: 47mm

Housing Dimensions:
Height: 28mm
Length: 84mm
Width: 21mm
flowSCREW 2

Housing Dimensions:
Height: 17mm
Length: 117mm
Width: 64mm

flowSCREW 3

Housing Dimensions:
Height: 17mm
Length: 150mm
Width: 64mm
flowSCREW 4W

Housing Dimensions:
Height: 40mm
Length: 317mm
Width: 130mm

flat 1

Housing Dimensions:
Height: 13mm
Length: 108mm
Width: 47mm
MiniSKiiP® 0

Housing Dimensions:
Height: 16mm
Length: 42mm
Width: 40mm

MiniSKiiP® 1

Housing Dimensions:
Height: 16mm
Length: 42mm
Width: 40mm
MiniSKiiP® 2

Housing Dimensions:
Height: 16mm
Length: 59mm
Width: 52mm

MiniSKiiP® 3

Housing Dimensions:
Height: 16mm
Length: 82mm
Width: 59mm
MiniSKiiP® Options

Lids
Two lids are available for all MiniSKiiP® modules:

- Standard 6.5mm-high version allowing SMD parts to be mounted below the lid
- Ultra thin 2.8mm-high version sized for highly compact mechanical designs

Thermal Paste
Vincotech offers MiniSKiiP® modules with pre-applied thermal paste.

- Faster and easier assembly of the module
- Thermal conducting material with optimized thickness
- Lower thermal resistance and reduced risk of DCB cracking
- Easier production process; no need for screen printing facilities
- Automated screen printing for utmost precision and reliability
- Standard solder profile applicable (e.g. J-STD-001, J-STD-003)

Properties

<table>
<thead>
<tr>
<th>Material</th>
<th>Wacker® Paste 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal conductivity</td>
<td>0.81 W/m*K</td>
</tr>
</tbody>
</table>

Order Codes

Example order code V1: V23990-K220-A40/1A/PM
Example order code V2: 80-M2068/A045FH-K999E10/1A/

Please ask your sales rep about the availability of MiniSKiiP® options.

<table>
<thead>
<tr>
<th>Option Code</th>
<th>Lid</th>
<th>Thermal Paste P12</th>
</tr>
</thead>
<tbody>
<tr>
<td>/0A/</td>
<td>Standard (6.5mm)</td>
<td>-</td>
</tr>
<tr>
<td>/1A/</td>
<td>Standard (6.5mm)</td>
<td>Applied</td>
</tr>
<tr>
<td>/0B/</td>
<td>Thin (2.8mm)</td>
<td>-</td>
</tr>
<tr>
<td>/1B/</td>
<td>Thin (2.8mm)</td>
<td>Applied</td>
</tr>
</tbody>
</table>
The benefits of using phase change material for thermal conducting between the module and heat sink are considerable. This material is solid at room temperature. This makes it smear-resistant during transportation and when assembling the module. The screen-printing process is very accurate, so the material’s thickness is well defined and can be optimized for maximum heat transfer capability.

- Faster and easier assembly of the module
- Thermal conducting material with optimized thickness
- Better $R_{th}$ and reduced risk of DCB cracking
- Easier production process; no need for screen printing facilities
- Automated screen printing for utmost precision and reliability
- No risk of smearing the thermal paste; material is solid at room temperature
- Standard solder profile applicable (e.g. J-STD-001, J-STD-003)

### Properties

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal conductivity</td>
<td>3.4</td>
<td>W/m*K</td>
</tr>
<tr>
<td>Phase change temperature</td>
<td>+45</td>
<td>°C</td>
</tr>
</tbody>
</table>

### Order Codes

Option code for the phase change material for flow 0 and flow 1 modules is /3/ (see also page 42).

Example order code V1:
V23990-P840-A48-/3/-PM

Example order code V2:
10-FZ06BIA045FH01-P897E10-/3/

Please ask your sales rep about the availability of phase change material.
Save Time – Press in!
Press-fit Technology

Vincotech's new Press-fit technology reduces PCB assembly time and effort considerably. Well established in the automotive industry, the Press-fit pin eliminates the need for soldering. This cuts process time and costs, and boosts production output capacity. With no need to solder modules, engineers enjoy far greater flexibility in design. The module can easily be mounted on the other side of the PCB at no extra cost and effort.

- Approved rounded Press-fit area
- Complies with DIN and IEC standards
- Tapered pin head
- Same Press-fit area for all power ranges
- Available in three versions, covering all Vincotech power module families:
  - For 12mm base plate-less housings
  - For 17mm base plate-less housings
  - For 17mm housings with base plate

- Eliminates costly additional soldering process
- Pins are compatible with legacy solder pin modules
- Very high current capability (30A @ 80°C)
- Reliable cold welding connection to PCB
- No PCB hole damage, allowing for reuse
- Thermo-mechanical push and pull-force relief
- Flexible mounting onto the power module DCB
- Cuts production costs

Order Codes
Order code V1:
Press-fit option is shown as an additional letter Y at the end of option code (see also page 42).
Example order code V1:
V23990-P840-F49Y-PM

Order code V2:
Press-fit option is shown as alternative housing (see also page 42).
Example order code V2:
10-PZ06BIA045FH01-P897E10

Please ask your sales rep about the availability of Press-fit options.
Description – Naming System

Vincotech is transitioning to a new, more consistent naming system for power modules.

**VERSION 1**

This ordering code is identical with the product name shown here. It remains valid for all products released before mid-2009 and subsequent releases within product families established before 2009.

**VERSION 2**

Version 2 introduces a new name and ordering code for products released after mid-2009.

- The new product name describes the module’s characteristics.
- The new ordering code extends the product’s name. It is listed in the product data sheet.

### Leading Number:
- V23990: Power modules
- V23109: Relays
- S30814: Hybrids

### Product Identification:
- First two digits: Product family identifier
- Last digit: Module identifier
- Modules are listed from lowest to highest power (e.g. 600V/5A – 1200V/15A)

### Product Classification:
- P: flow power modules
- K: MiniSKiiP® power modules
- S: Relays
- Q: Hybrids

### Product Name
(find in product data sheet)

### Order Code
(find in product data sheet)

### Option Code
Different housings
Optional DCB material
Optional parts (e.g. brake)
Y as last letter
Press-fit option (see also page 41)

### Option Code 2 (optional)
Phase change material (see also page 40)
MiniSKiiP® options (see also page 39)

### Technology Group
for UL notification

### Internal Identifier

**PART NUMBER ENDING**

### Voltage
- 06: 600V
- 09: 900V
- 07: 650V
- 12: 1200V

### Pinout
- Modules with same topology, same housing, and same pinout have same character

### Current (R_{DSS})
- 045 (IGBT): 45A
- 045 (MOS): 45mOhm

### Option Code
Eg. alternative parts

### Option Code (optional)
Phase change material (see also page 40)
MiniSKiiP® options (see also page 39)

### Chip Technology
- SA: IGBT3 Standard
- SB: IGBT3 Low Loss
- SG: IGBT3 High Speed
- SC: IGBT4 Low Power
- SH: IGBT4 High Speed
- FB: IGBT2 High Speed
- FE: IGBT2 Phantom Speed
- FH: CoolMOS CP
- FS: CoolMOS C6
- Fi: CoolMOS CFD
- FP: Parallel Switch
- MC: MOSFET + SiC
- MF: MOSFET + Fast Diode

### Pinout Characteristics
- Different housings
- Optional parts (e.g. brake)
- Optional DCB material
- Press-fit option (see also page 41)

### Option Code
Eg. alternative parts
Simulation Software
Vincotech ISE

The Integrated Simulation Environment

The Vincotech ISE is an integrated simulation and selection environment for power and solar modules. The program contains updated versions of the previously introduced applications flowSIM and flowSEL and new applications such as flowSOL and flowMIS.

Software Download:

Step 01: Download and install LabVIEW Runtime Engine once (if not already installed).
Direct link: www.vincotech.com/simulation_software.html

Step 02: Download Vincotech ISE.exe into your simulation directory.

Step 03: Start Vincotech ISE.exe

1 flowSIM is a tool that interactively calculates power dissipations and temperatures using Vincotech power modules. It helps you select the right devices for your application. Its power loss and device temperature calculations are based on fully measured parameters.

2 flowSEL is a tool that helps you choose the right driver stage for your application. Using the generated curves as sources, you can obtain information about current, power and temperature conditions for your application.

3 flowSOL is a simulation tool for solar modules. The program is based on and behaves much like flowSIM.

4 flowMIS is a tool that simulates the power and temperature characteristics of modules excited with a given mission profile.
Vincotech, an independent company within the Mitsubishi Electric Corporation is a market leader in power modules. The enterprise develops and manufactures high-quality electronic power components for Motion Control, and Renewable Energy applications. With some 500 employees worldwide, backed by vast experience and a long history in electronics integration, Vincotech leverages these assets to help customers attain maximum market success.

Headquartered in Unterhaching near Munich, Germany, Vincotech also owns and operates a site in Bicske, Hungary. The ISO9001- and TS16949-certified factory in Hungary develops and manufactures all power modules. Engineered to comply with the RoHS standard, these modules are subjected to a battery of electrical and functional tests prior to packaging to ensure they fully satisfy Vincotech’s rigorous standards for quality.

The name Vincotech stands for highest product reliability, excellent customer service, and flexible, competitive solutions, all of which culminate in outstanding customer satisfaction.

Vincotech, your reliable partner!

The information provided herein is believed to be reliable at press time. Vincotech assumes no responsibility for inaccuracies or omissions. Vincotech assumes no responsibility for the use of this information, and all such information shall be entirely at the users own risk. Prices and specifications are subject to change without notice. Vincotech does not authorize or warrant any of its products for use in life-support devices and / or systems.

COOLMOS is a trademark of Infineon Technologies AG.
Fairchild is a trademark. STEALTH is a trademark of Fairchild Semiconductors
SEMIKRON is a trademark. MiniSKiiP is a trademark of SEMIKRON Elektronik GmbH & Co. KG.
Vincotech is a trademark. PIM is a trademark of Vincotech Holdings S.A./L.
Wacker is a trademark of Wacker Chemie AG.

Your local contact:

Vincotech GmbH
Böberger Straße 93
82008 Unterhaching/Munich
Germany
Tel: +49 (0)89 8780 67-0
Fax: +49 (0)89 8780 67-300
www.vincotech.com