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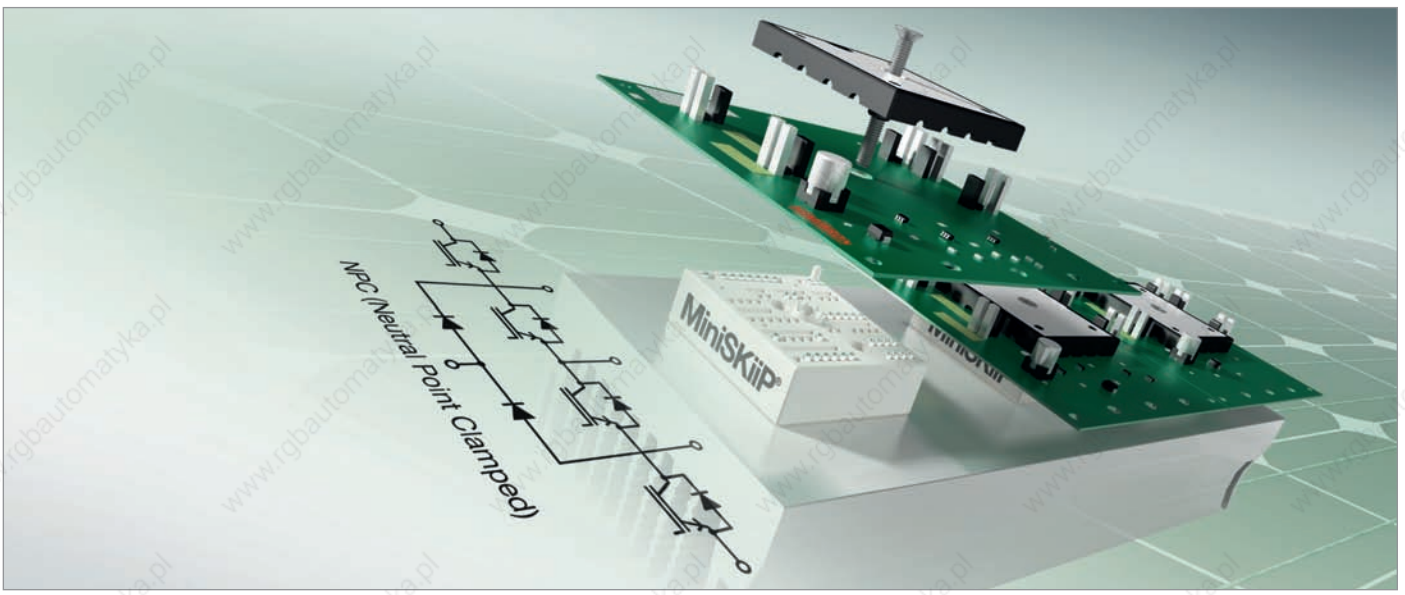
# MiniSKiiP® 3-level

## A new dimension of power density in multilevel applications




### Applications

The MiniSKiiP 3-level power modules are most suitable for applications requiring a high level of efficiency and a better output waveform quality, e.g. for uninterruptible power supply systems (UPS) and solar inverters. Especially at switching frequencies above 8 kHz, the 3-level topology provides reduction of overall losses up to 40% compared to a conventional 2-level solution.

### Product range

The MiniSKiiP 3-level power modules are available up to 200A in NPC (Neutral Clamping Point) topology and in the MiniSKiiP housing sizes 2 and 3. All modules are featuring Trench Field Stop IGBT4 with a blocking voltage of 650 V and SEMIKRON CAL I4F diodes.

### Benefits

The MiniSKiiP 3-level power modules combine all electrical advantages of 3-level topology with a well-established MiniSKiiP mechanical concept consisting of pressure contact technology for quick and easy solder-free assembly. While a soldered module is assembled in a time consuming production process requiring expensive automatic soldering equipment, MiniSKiiP 3-level power modules will be assembled in one step without costly special equipment.

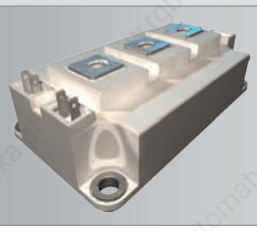
# IGBT Modules

## SEMiX®

half bridge
6-pack
chopper

600V/1200V/1700V
75A 600A

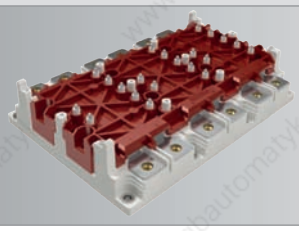
## SEMITRANS®



half bridge
6-pack
chopper
single switch

600V/1200V/1700V
35A 900A

## SKiM® 63/93



6-pack
3-level

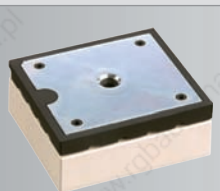
600V/1200V/1700V
300A 900A

## SKiM® 4/5

6-pack
3-level

650V/1200V/1700V
200A 600A

## MiniSKiiP®



6-pack
3-level

600V/1200V
8A 200A

## SEMITOP®

half bridge
6-pack
3-level
chopper
single switch

600V/1200V
10A 200A

$I_{Cnom}$ [A] 8 10 35 75 200 300 600 900

# IGBT and rectifier module family for solder-free assemblies

## Applications

SEMiX is a flexible and application-oriented module. On the basis of a scalable platform concept, modern chip technology is integrated into IGBT and rectifier modules, which are used in a wide variety of applications such as AC motor drives, switching power supplies and current source inverters. Other typical applications are matrix converters, uninterruptible power supplies and electronic welding devices.

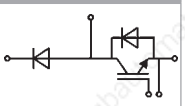
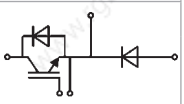
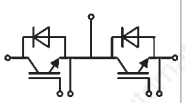
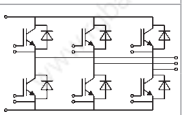
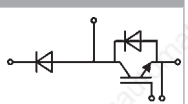
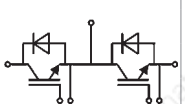
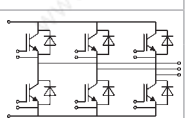
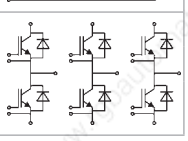
## Product range

Six different housing sizes are available in the voltage classes 600 V, 1200 V and 1700 V for IGBT modules. Half-bridge, six-pack and chopper topologies are available for a current range of 75 A to 600 A. Besides IGBT3 and IGBT4 chips, the 1200 V range now also includes a new series with V-IGBT devices. Controlled, half-controlled and uncontrolled rectifier modules with same footprint and 17 mm module height are also available.

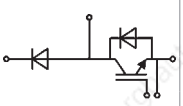
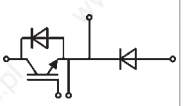
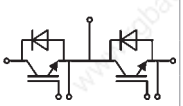
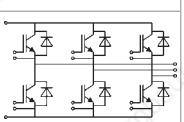
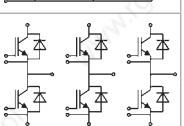
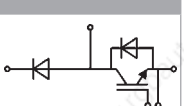
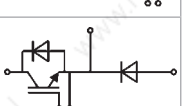
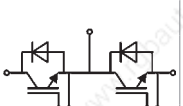
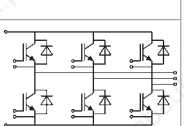
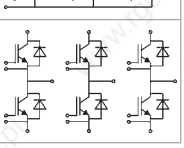
## Benefits

- Fast assembly in one direction from above
- Solder-free connection to control unit using reliable spring contacts
- Separation of control unit, AC and DC terminals
- Direct driver assembly
- Same-height (17 mm) IGBT and rectifier modules
- Flat and compact inverter design
- Optimized production at customer site
- Easy servicing

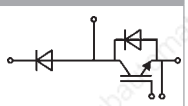
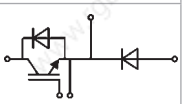
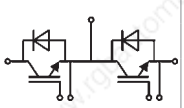
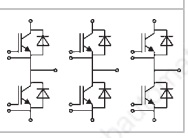
# Modules - IGBT - SEMiX

| Type | IGBT | | | | | | Diode | | | | Case | | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_C$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on}$ | $E_{off}$ | $R_{th(j-c)}$ | $I_F$ @$T_C$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | $R_{th(j-c)}$ | Case | $R_{th(c-s)}$ | |
| | A | A | V | mJ | mJ | K/W | A | V | mJ | K/W | | K/W | |
| **600 V - IGBT 3 (Trench)** | | | | | | | | | | | | | |
| **SEMiX402GAL066HDs** | 502 | 400 | 1.45 | 22 | 24 | 0.12 | 543 | 1.4 | 10 | 0.15 | 2s | 0.045 |  |
| **SEMiX603GAL066HDs** | 720 | 600 | 1.45 | 12 | 43 | 0.087 | 771 | 1.4 | 13 | 0.11 | 3s | 0.04 | |
| **SEMiX402GAR066HDs** | 502 | 400 | 1.45 | 22 | 24 | 0.12 | 543 | 1.4 | 10 | 0.15 | 2s | 0.045 |  |
| **SEMiX603GAR066HDs** | 720 | 600 | 1.45 | 12 | 43 | 0.087 | 771 | 1.4 | 13 | 0.11 | 3s | 0.04 | |
| **SEMiX202GB066HDs** | 274 | 200 | 1.45 | 6 | 8 | 0.21 | 291 | 1.4 | 6.5 | 0.27 | 2s | 0.045 |  |
| **SEMiX302GB066HDs** | 379 | 300 | 1.45 | 11.5 | 15 | 0.16 | 419 | 1.4 | 7.5 | 0.19 | 2s | 0.045 | |
| **SEMiX402GB066HDs** | 502 | 400 | 1.45 | 22 | 24 | 0.12 | 543 | 1.4 | 10 | 0.15 | 2s | 0.045 | |
| **SEMiX603GB066HDs** | 720 | 600 | 1.45 | 12 | 43 | 0.087 | 771 | 1.4 | 13 | 0.11 | 3s | 0.04 | |
| **SEMiX101GD066HDs** | 139 | 100 | 1.45 | 3 | 4 | 0.41 | 151 | 1.4 | 4.5 | 0.51 | 13 | 0.04 |  |
| **SEMiX151GD066HDs** | 200 | 150 | 1.45 | 3.8 | 6.1 | 0.29 | 219 | 1.4 | 5.8 | 0.36 | 13 | 0.04 | |
| **SEMiX201GD066HDs** | 259 | 200 | 1.45 | 5 | 8 | 0.23 | 284 | 1.4 | 7.5 | 0.28 | 13 | 0.04 | |
| **1200 V - V-IGBT** | | | | | | | | | | | | | |
| **SEMiX151GAL12Vs** [1] | 231 | 150 | 1.75 | 19.4 | 17.1 | 0.19 | 189 | 2.1 | 11.5 | 0.31 | 1s | 0.075 |  |
| **SEMiX151GB12Vs** | 231 | 150 | 1.75 | 19.4 | 17.1 | 0.19 | 189 | 2.14 | 11.5 | 0.31 | 1s | 0.075 |  |
| **SEMiX202GB12Vs** | 310 | 200 | 1.75 | 24.9 | 24.1 | 0.14 | 229 | 2.2 | 14.5 | 0.26 | 2s | 0.045 | |
| **SEMiX223GB12Vs** | 323 | 225 | 1.85 | 19.9 | 27.2 | 0.14 | 263 | 2.2 | 16.4 | 0.23 | 3s | 0.04 | |
| **SEMiX302GB12Vs** | 448 | 300 | 1.75 | 37.3 | 36.1 | 0.1 | 356 | 2.1 | 21.8 | 0.17 | 2s | 0.045 | |
| **SEMiX303GB12Vs** | 448 | 300 | 1.75 | 26.5 | 36.3 | 0.1 | 327 | 2.2 | 21.4 | 0.19 | 3s | 0.04 | |
| **SEMiX404GB12Vs** | 596 | 400 | 1.75 | 39.1 | 52.3 | 0.075 | 440 | 2.2 | 34.3 | 0.14 | 4s | 0.03 | |
| **SEMiX453GB12Vs** | 673 | 450 | 1.75 | 39.8 | 54.4 | 0.067 | 516 | 2.1 | 32.7 | 0.12 | 3s | 0.04 | |
| **SEMiX603GB12Vs** [1] | 800 | 600 | 1.85 | 50 | 83 | 0.057 | 516 | 2.4 | 40 | 0.12 | 3s | 0.04 | |
| **SEMiX604GB12Vs** | 880 | 600 | 1.75 | 58.7 | 78.5 | 0.051 | 707 | 2.1 | 49.5 | 0.086 | 4s | 0.03 | |
| **SEMiX101GD12Vs** | 159 | 100 | 1.75 | 12.9 | 11.4 | 0.27 | 121 | 2.2 | 7.7 | 0.48 | 13 | 0.04 |  |
| **SEMiX151GD12Vs** | 231 | 150 | 1.75 | 19.4 | 17.1 | 0.19 | 189 | 2.1 | 11.5 | 0.31 | 13 | 0.04 | |
| **SEMiX223GD12Vc** | 323 | 225 | 1.85 | 19.9 | 27.2 | 0.14 | 263 | 2.2 | 16.4 | 0.23 | 33c | 0.014 |  |
| **SEMiX303GD12Vc** | 448 | 300 | 1.75 | 26.5 | 36.3 | 0.1 | 327 | 2.2 | 21.4 | 0.19 | 33c | 0.014 | |
| **SEMiX453GD12Vc** | 673 | 450 | 1.75 | 39.8 | 54.4 | 0.067 | 516 | 2.1 | 32.7 | 0.12 | 33c | 0.014 | |

# Modules - IGBT - SEMiX

| Type | IGBT | | | | | | Diode | | | | Case | | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_C$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on}$ | $E_{off}$ | $R_{th(j-c)}$ | $I_F$ @$T_C$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | $R_{th(j-c)}$ | Case | $R_{th(c-s)}$ | |
| | A | A | V | mJ | mJ | K/W | A | V | mJ | K/W | | K/W | |
| **1200 V - IGBT 4 (Trench)** | | | | | | | | | | | | | |
| SEMiX151GAL12E4HDs | 232 | 150 | 1.8 | 18 | 18 | 0.19 | 207 | 1.7 | 12 | 0.31 | 1s | 0.075 |  |
| SEMiX302GAL12E4HDs | 463 | 300 | 1.8 | 33 | 44 | 0.096 | 387 | 1.7 | 25 | 0.17 | 2s | 0.045 | |
| SEMiX453GAL12E4HDs | 683 | 450 | 1.8 | 50 | 67 | 0.065 | 592 | 1.7 | 36 | 0.11 | 3s | 0.04 | |
| SEMiX604GAL12E4HDs | 916 | 600 | 1.8 | 38 | 110 | 0.049 | 777 | 1.7 | 57 | 0.086 | 4s | 0.03 | |
| SEMiX151GAR12E4HDs | 232 | 150 | 1.8 | 18 | 18 | 0.19 | 207 | 1.7 | 12 | 0.31 | 1s | 0.075 |  |
| SEMiX302GAR12E4HDs | 463 | 300 | 1.8 | 33 | 44 | 0.096 | 387 | 1.7 | 25 | 0.17 | 2s | 0.045 | |
| SEMiX453GAR12E4HDs | 683 | 450 | 1.8 | 50 | 67 | 0.065 | 592 | 1.7 | 36 | 0.11 | 3s | 0.04 | |
| SEMiX604GAR12E4HDs | 916 | 600 | 1.8 | 38 | 110 | 0.049 | 777 | 1.7 | 57 | 0.086 | 4s | 0.03 | |
| SEMiX151GB12E4HDs | 232 | 150 | 1.8 | 18 | 18 | 0.19 | 207 | 1.7 | 12 | 0.31 | 1s | 0.075 |  |
| SEMiX202GB12E4HDs | 314 | 200 | 1.8 | 24 | 28 | 0.14 | 249 | 1.8 | 16 | 0.26 | 2s | 0.045 | |
| SEMiX302GB12E4HDs | 463 | 300 | 1.8 | 33 | 44 | 0.096 | 387 | 1.7 | 25 | 0.17 | 2s | 0.045 | |
| SEMiX303GB12E4HDs | 466 | 300 | 1.8 | 33 | 41 | 0.095 | 362 | 1.8 | 23 | 0.18 | 3s | 0.04 | |
| SEMiX404GB12E4HDs | 618 | 400 | 1.8 | 30 | 60 | 0.072 | 471 | 1.8 | 34 | 0.14 | 4s | 0.03 | |
| SEMiX453GB12E4HDs | 683 | 450 | 1.8 | 50 | 67 | 0.065 | 592 | 1.7 | 36 | 0.11 | 3s | 0.04 | |
| SEMiX604GB12E4HDs | 916 | 600 | 1.8 | 38 | 110 | 0.049 | 777 | 1.7 | 57 | 0.086 | 4s | 0.03 | |
| SEMiX71GD12E4HDs | 115 | 75 | 1.85 | 8.5 | 9 | 0.38 | 107 | 1.7 | 7 | 0.58 | 13 | 0.04 |  |
| SEMiX101GD12E4HDs | 160 | 100 | 1.8 | 12 | 13 | 0.27 | 130 | 1.8 | 8 | 0.48 | 13 | 0.04 | |
| SEMiX151GD12E4HDs | 232 | 150 | 1.8 | 16 | 19 | 0.19 | 207 | 1.7 | 16 | 0.31 | 13 | 0.04 | |
| SEMiX223GD12E4HDc | 333 | 225 | 1.85 | 24 | 31 | 0.135 | 296 | 1.7 | 22 | 0.22 | 33c | 0.014 |  |
| SEMiX303GD12E4HDc | 466 | 300 | 1.8 | 33 | 42 | 0.095 | 362 | 1.8 | 30 | 0.18 | 33c | 0.014 | |
| SEMiX453GD12E4HDc | 683 | 450 | 1.8 | 57 | 68 | 0.065 | 592 | 1.7 | 36 | 0.11 | 33c | 0.014 | |
| **1200 V - IGBT 3 (Trench)** | | | | | | | | | | | | | |
| SEMiX452GAL126HDs | 455 | 300 | 1.7 | 35 | 45 | 0.083 | 394 | 1.6 | 33 | 0.15 | 2s | 0.045 |  |
| SEMiX703GAL126HDs | 642 | 450 | 1.7 | 32 | 68 | 0.061 | 561 | 1.6 | 60 | 0.11 | 3s | 0.04 | |
| SEMiX703GAR126HDs | 642 | 450 | 1.7 | 32 | 68 | 0.061 | 561 | 1.6 | 60 | 0.11 | 3s | 0.04 |  |
| SEMiX252GB126HDs | 242 | 150 | 1.7 | 20 | 21 | 0.15 | 228 | 1.6 | 18 | 0.24 | 2s | 0.045 | |
| SEMiX302GB126HDs | 311 | 200 | 1.7 | 30 | 26 | 0.12 | 292 | 1.6 | 22.5 | 0.19 | 2s | 0.045 | |
| SEMiX353GB126HDs | 364 | 225 | 1.7 | 26.5 | 32.5 | 0.1 | 329 | 1.6 | 29 | 0.17 | 3s | 0.04 | |
| SEMiX452GB126HDs | 455 | 300 | 1.7 | 35 | 45 | 0.083 | 394 | 1.6 | 33 | 0.15 | 2s | 0.045 |  |
| SEMiX503GB126HDs | 466 | 300 | 1.7 | 28 | 44 | 0.08 | 431 | 1.6 | 32.5 | 0.13 | 3s | 0.04 | |
| SEMiX604GB126HDs | 590 | 400 | 1.7 | 36 | 60 | 0.065 | 533 | 1.6 | 46 | 0.11 | 4s | 0.03 | |
| SEMiX703GB126HDs | 642 | 450 | 1.7 | 32 | 68 | 0.061 | 561 | 1.6 | 60 | 0.11 | 3s | 0.04 | |
| SEMiX904GB126HDs | 821 | 600 | 1.7 | 60 | 88 | 0.05 | 752 | 1.6 | 75 | 0.081 | 4s | 0.03 | |
| SEMiX101GD126HDs | 129 | 75 | 1.7 | 10 | 11 | 0.27 | 117 | 1.6 | 9 | 0.46 | 13 | 0.04 |  |
| SEMiX151GD126HDs | 168 | 100 | 1.7 | 12 | 14 | 0.21 | 152 | 1.6 | 11.5 | 0.36 | 13 | 0.04 | |
| SEMiX251GD126HDs | 242 | 150 | 1.7 | 19 | 22 | 0.15 | 207 | 1.6 | 14.5 | 0.28 | 13 | 0.04 | |
| SEMiX353GD126HDc | 364 | 225 | 1.7 | 26.5 | 32.5 | 0.1 | 329 | 1.6 | 29 | 0.17 | 33c | 0.014 |  |
| SEMiX503GD126HDc | 466 | 300 | 1.7 | 28 | 44 | 0.08 | 412 | 1.6 | 32.5 | 0.14 | 33c | 0.014 | |
| SEMiX703GD126HDc | 642 | 450 | 1.7 | 32 | 68 | 0.061 | 561 | 1.6 | 60 | 0.11 | 33c | 0.014 | |

# Modules - IGBT - SEMiX

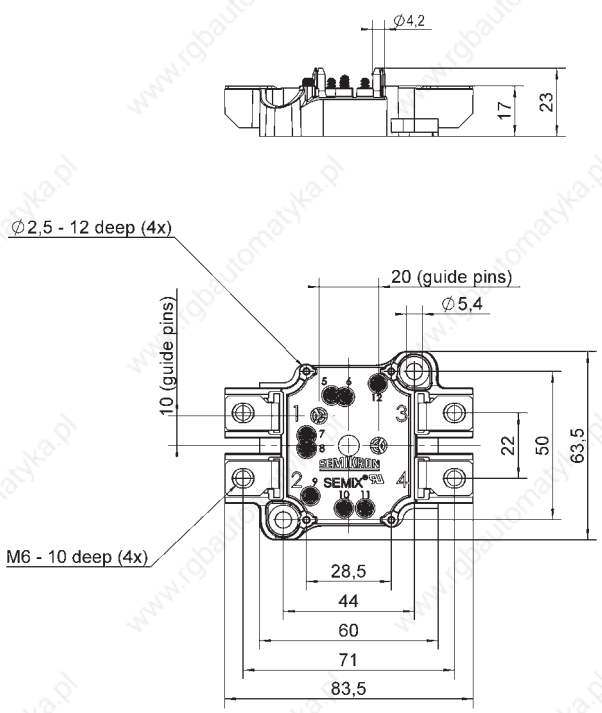
| Type | IGBT | | | | | | Diode | | | | Case | | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_C$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on}$ | $E_{off}$ | $R_{th(j-c)}$ | $I_F$ @$T_C$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | $R_{th(j-c)}$ | Case | $R_{th(c-s)}$ | |
| | A | A | V | mJ | mJ | K/W | A | V | mJ | K/W | | K/W | |
| **1700 V - IGBT 3 (Trench)** | | | | | | | | | | | | | |
| **SEMiX653GAL176HDs** | 619 | 450 | 2 | 300 | 180 | 0.054 | 545 | 1.7 | 73 | 0.11 | 3s | 0.04 |  |
| **SEMiX653GAR176HDs** | 619 | 450 | 2 | 300 | 180 | 0.054 | 545 | 1.7 | 73 | 0.11 | 3s | 0.04 |  |
| **SEMiX252GB176HDs** | 246 | 150 | 2 | 90 | 55 | 0.12 | 288 | 1.6 | 32 | 0.19 | 2s | 0.045 | |
| **SEMiX302GB176HDs** | 308 | 200 | 2 | 130 | 77 | 0.1 | 389 | 1.5 | 43 | 0.15 | 2s | 0.045 | |
| **SEMiX353GB176HDs** | 353 | 225 | 2 | 155 | 85 | 0.086 | 428 | 1.6 | 45 | 0.13 | 3s | 0.04 | |
| **SEMiX452GB176HDs** | 437 | 300 | 2 | 180 | 110 | 0.073 | 389 | 1.7 | 46 | 0.15 | 2s | 0.045 |  |
| **SEMiX453GB176HDs** | 444 | 300 | 2 | 215 | 125 | 0.071 | 545 | 1.5 | 65 | 0.11 | 3s | 0.04 | |
| **SEMiX604GB176HDs** | 567 | 400 | 2 | 215 | 165 | 0.058 | 740 | 1.5 | 95 | 0.081 | 4s | 0.03 | |
| **SEMiX653GB176HDs** | 619 | 450 | 2 | 300 | 180 | 0.054 | 545 | 1.7 | 73 | 0.11 | 3s | 0.04 | |
| **SEMiX854GB176HDs** | 779 | 600 | 2 | 300 | 250 | 0.045 | 740 | 1.7 | 170 | 0.081 | 4s | 0.03 | |
| **SEMiX353GD176HDc** | 353 | 225 | 2 | 155 | 85 | 0.086 | 428 | 1.6 | 45 | 0.13 | 33c | 0.014 |  |
| **SEMiX453GD176HDc** | 444 | 300 | 2 | 215 | 125 | 0.071 | 545 | 1.5 | 65 | 0.11 | 33c | 0.014 | |
| **SEMiX653GD176HDc** | 619 | 450 | 2 | 300 | 180 | 0.054 | 545 | 1.7 | 73 | 0.11 | 33c | 0.014 | |

## Footnotes

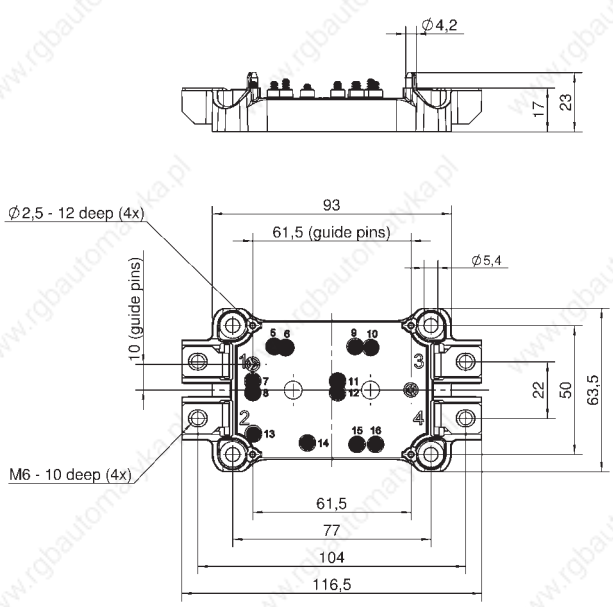
1) New

## Cases

### SEMiX 1s




### SEMiX 2s

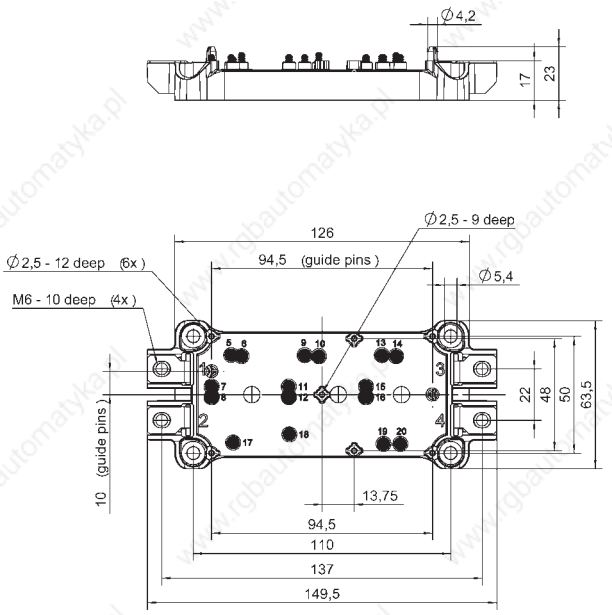



Dimensions in mm

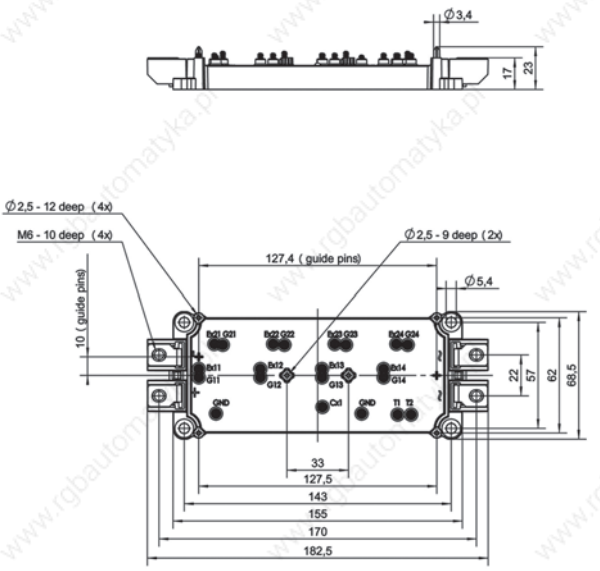
# Modules - IGBT - SEMiX

## Cases

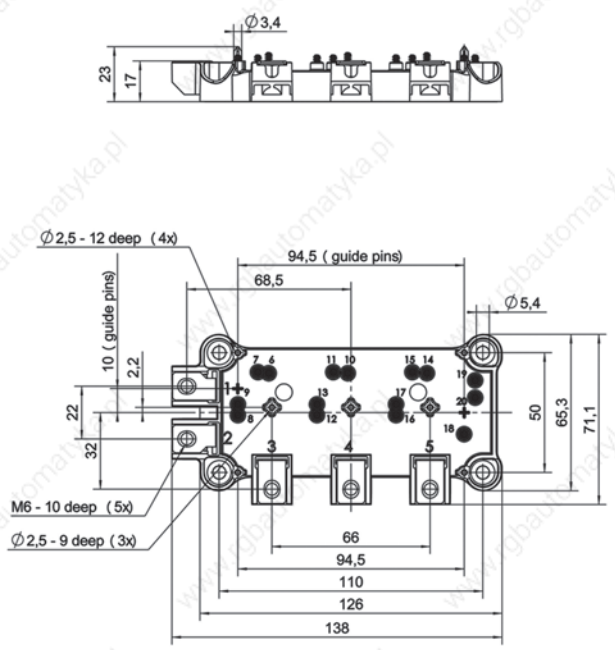
### SEMiX 3s



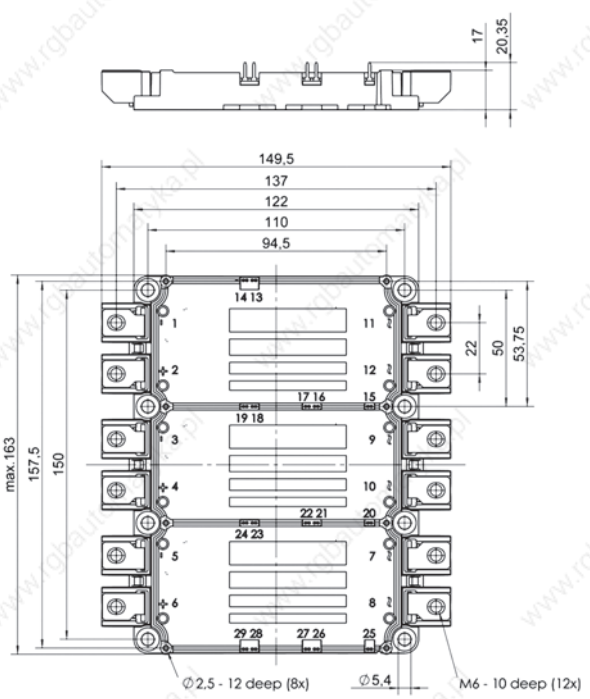

### SEMiX 4s




### SEMiX 13

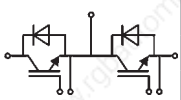
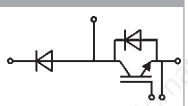
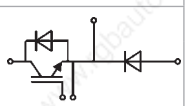
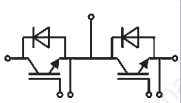
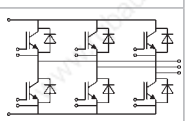
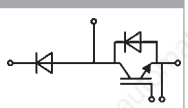
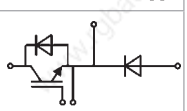
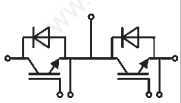



### SEMiX 33c

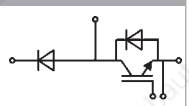
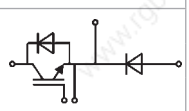
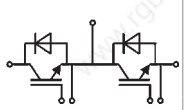
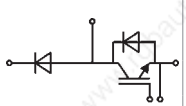
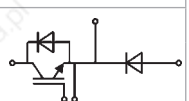
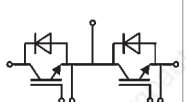
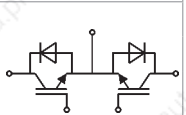
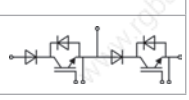



**Dimensions in mm**

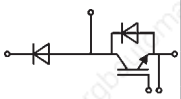
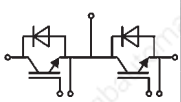
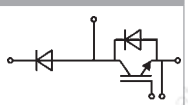
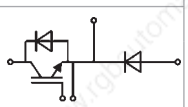
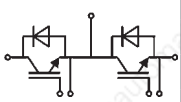
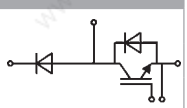
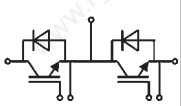
# Modules - IGBT - SEMITRANS

| Type | IGBT | | | | | | Diode | | | | Case | | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_C$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on}$ | $E_{off}$ | $R_{th(j-c)}$ | $I_F$ @$T_C$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | $R_{th(j-c)}$ | Case | $R_{th(c-s)}$ | |
| | A | A | V | mJ | mJ | K/W | A | V | mJ | K/W | | K/W | |
| **600 V - IGBT 3 (Trench)** | | | | | | | | | | | | | |
| SKM145GB066D | 195 | 150 | 1.45 | 8.5 | 5.5 | 0.3 | 150 | 1.38 | 3.5 | 0.5 | 2 | 0.05 | |
| SKM195GB066D | 265 | 200 | 1.45 | 14 | 8 | 0.22 | 200 | 1.35 | 5.6 | 0.4 | 2 | 0.05 |  |
| SKM300GB066D | 390 | 300 | 1.45 | 7.5 | 11.5 | 0.15 | 350 | 1.38 | 10.5 | 0.25 | 3 | 0.038 | |
| SKM400GB066D | 500 | 400 | 1.45 | 8 | 16 | 0.12 | 450 | 1.35 | 14 | 0.2 | 3 | 0.038 | |
| SKM600GB066D | 760 | 600 | 1.45 | 7.5 | 29.5 | 0.08 | 700 | 1.38 | 25 | 0.125 | 3 | 0.038 | |
| **600 V - NPT IGBT (Standard)** | | | | | | | | | | | | | |
| SKM75GAL063D [1] | 100 | 75 | 2.1 | 3 | 2.5 | 0.35 | 75 | 1.55 | 0.53 | 0.72 | 2 | 0.05 | |
| SKM300GAL063D [1] | 400 | 300 | 2.1 | 14 | 13 | 0.09 | 250 | 1.65 | 4 | 0.25 | 3 | 0.038 |  |
| SKM75GAR063D [1] | 100 | 75 | 2.1 | 3 | 2.5 | 0.35 | 75 | 1.55 | 0.53 | 0.72 | 2 | 0.05 | |
| SKM300GAR063D [1] | 400 | 300 | 2.1 | 14 | 13 | 0.09 | 250 | 1.65 | 4 | 0.25 | 3 | 0.038 |  |
| SKM50GB063D [1] | 70 | 50 | 2.1 | 2.5 | 1.8 | 0.5 | 75 | 1.35 | 0.48 | 1 | 2 | 0.05 | |
| SKM75GB063D [1] | 100 | 75 | 2.1 | 3 | 2.5 | 0.35 | 75 | 1.55 | 0.53 | 0.72 | 2 | 0.05 | |
| SKM100GB063D [1] | 130 | 100 | 2.1 | 4 | 3 | 0.27 | 100 | 1.55 | 1.5 | 0.6 | 2 | 0.05 |  |
| SKM200GB063D [1] | 260 | 200 | 2.1 | 11 | 7.5 | 0.14 | 200 | 1.55 | 2.1 | 0.3 | 3 | 0.038 | |
| SKM300GB063D [1] | 400 | 300 | 2.1 | 14 | 13 | 0.09 | 250 | 1.65 | 4 | 0.25 | 3 | 0.038 | |
| SKM100GD063DL [1] | 130 | 100 | 2.1 | 4 | 3 | 0.27 | 100 | 1.55 | 1.5 | 0.6 | 6 | 0.05 |  |
| **1200 V - V-IGBT** | | | | | | | | | | | | | |
| SKM150GAL12V [2] | 231 | 150 | 1.75 | 13.5 | 14.2 | 0.19 | 189 | 2.14 | 8.9 | 0.31 | 2 | 0.05 | |
| SKM400GAL12V [2] | 612 | 400 | 1.75 | 39 | 42 | 0.072 | 440 | 2.20 | 26 | 0.14 | 3 | 0.038 |  |
| SKM400GAR12V [2] | 612 | 400 | 1.75 | 39 | 42 | 0.072 | 440 | 2.20 | 26 | 0.14 | 3 | 0.038 |  |
| SKM300GA12V [2] | 420 | 300 | 1.85 | 23 | 33 | 0.11 | 353 | 2.17 | 21 | 0.17 | 4 | 0.038 | |
| SKM400GA12V [2] | 612 | 400 | 1.75 | 39 | 42 | 0.072 | 440 | 2.20 | 26 | 0.14 | 4 | 0.038 | |
| SKM600GA12V [2] | 908 | 600 | 1.75 | 76 | 76 | 0.049 | 707 | 2.14 | 43 | 0.086 | 4 | 0.038 | |
| SKM50GB12V [2] | 77 | 50 | 1.85 | 5 | 4 | 0.53 | 65 | 2.22 | 3.6 | 0.84 | 2 | 0.05 | |
| SKM75GB12V [2] | 114 | 75 | 1.85 | 6.7 | 7.1 | 0.38 | 97 | 2.17 | 4.2 | 0.58 | 2 | 0.05 | |
| SKM100GB12V [2] | 159 | 100 | 1.75 | 10.7 | 8.7 | 0.27 | 121 | 2.20 | 5.7 | 0.48 | 2 | 0.05 | |
| SKM150GB12V [2] | 231 | 150 | 1.75 | 13.5 | 14.2 | 0.19 | 189 | 2.14 | 8.9 | 0.31 | 2 | 0.05 |  |
| SKM150GB12VG [2] | 222 | 150 | 1.85 | 10 | 16.5 | 0.2 | 187 | 2.17 | 11 | 0.31 | 3 | 0.038 | |
| SKM200GB12V [2] | 311 | 200 | 1.75 | 14 | 22 | 0.14 | 229 | 2.20 | 13 | 0.26 | 3 | 0.038 | |
| SKM300GB12V [2] | 420 | 300 | 1.85 | 23 | 33 | 0.11 | 353 | 2.17 | 21 | 0.17 | 3 | 0.038 | |
| SKM400GB12V [2] | 612 | 400 | 1.75 | 39 | 42 | 0.072 | 440 | 2.20 | 26 | 0.14 | 3 | 0.038 | |

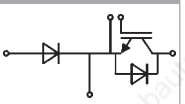
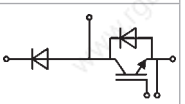
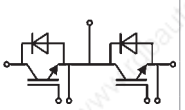
# Modules - IGBT - SEMITRANS

| Type | IGBT | | | | | | Diode | | | | Case | | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_C$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on}$ | $E_{off}$ | $R_{th(j-c)}$ | $I_F$ @$T_C$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | $R_{th(j-c)}$ | Case | $R_{th(c-s)}$ | |
| | A | A | V | mJ | mJ | K/W | A | V | mJ | K/W | | K/W | |
| **1200 V - IGBT 4 (Trench)** | | | | | | | | | | | | | |
| SKM200GAL12E4HD | 313 | 200 | 1.8 | 23 | 27 | 0.14 | 249 | 1.77 | 17 | 0.26 | 3 | 0.038 |  |
| SKM300GAL12E4HD | 422 | 300 | 1.85 | 30 | 39 | 0.11 | 387 | 1.72 | 30 | 0.17 | 3 | 0.038 | |
| SKM400GAL12E4HD | 616 | 400 | 1.8 | 36 | 56 | 0.072 | 471 | 1.77 | 40 | 0.14 | 3 | 0.038 | |
| SKM200GAR12E4HD | 313 | 200 | 1.8 | 21 | 27 | 0.14 | 249 | 1.77 | 13 | 0.26 | 3 | 0.038 |  |
| SKM300GAR12E4HD | 422 | 300 | 1.85 | 27 | 39 | 0.11 | 387 | 1.72 | 23 | 0.17 | 3 | 0.038 | |
| SKM400GAR12E4HD | 616 | 400 | 1.8 | 36 | 56 | 0.072 | 471 | 1.77 | 40 | 0.14 | 3 | 0.038 | |
| SKM300GA12E4HD | 422 | 300 | 1.85 | 29 | 35 | 0.11 | 387 | 1.72 | 29 | 0.17 | 4 | 0.038 | |
| SKM400GA12E4HD | 616 | 400 | 1.8 | 31 | 59 | 0.072 | 471 | 1.77 | 48 | 0.14 | 4 | 0.038 | |
| SKM600GA12E4HD | 913 | 600 | 1.8 | 81 | 84 | 0.049 | 777 | 1.72 | 49 | 0.086 | 4 | 0.038 | |
| SKM900GA12E4HD [2] | 1305 | 900 | 1.83 | 88 | 115 | 0.035 | 956 | 1.84 | 85 | 0.07 | 4 | 0.038 | |
| SKM200GB12E4HD | 313 | 200 | 1.8 | 23 | 27 | 0.14 | 249 | 1.77 | 17 | 0.26 | 3 | 0.038 |  |
| SKM300GB12E4HD | 422 | 300 | 1.85 | 30 | 39 | 0.11 | 387 | 1.72 | 30 | 0.17 | 3 | 0.038 | |
| SKM400GB12E4HD | 616 | 400 | 1.8 | 36 | 56 | 0.072 | 471 | 1.77 | 40 | 0.14 | 3 | 0.038 | |
| SKM450GB12E4HD [2] | 699 | 450 | 1.82 | 39 | 61 | 0.062 | 471 | 1.84 | 43 | 0.14 | 3 | 0.038 | |
| **1200 V - IGBT 4 Fast (Trench)** | | | | | | | | | | | | | |
| SKM50GAL12T4 [2] | 81 | 50 | 1.85 | 5.5 | 4.5 | 0.53 | 65 | 2.22 | 3.6 | 0.84 | 2 | 0.05 |  |
| SKM100GAL12T4 [2] | 160 | 100 | 1.8 | 15 | 10.2 | 0.27 | 121 | 2.20 | 5.9 | 0.48 | 2 | 0.05 | |
| SKM150GAL12T4 | 232 | 150 | 1.8 | 19.2 | 15.8 | 0.19 | 189 | 2.14 | 13 | 0.31 | 2 | 0.05 | |
| SKM200GAL12T4 | 313 | 200 | 1.8 | 21 | 20 | 0.14 | 229 | 2.20 | 13 | 0.26 | 3 | 0.038 | |
| SKM300GAL12T4 | 422 | 300 | 1.85 | 27 | 29 | 0.11 | 353 | 2.17 | 23 | 0.17 | 3 | 0.038 | |
| SKM400GAL12T4 | 616 | 400 | 1.8 | 33 | 42 | 0.072 | 440 | 2.20 | 30.5 | 0.14 | 3 | 0.038 | |
| SKM150GAR12T4 | 232 | 150 | 1.8 | 19.2 | 15.8 | 0.19 | 189 | 2.14 | 13 | 0.31 | 2 | 0.05 |  |
| SKM400GAR12T4 | 616 | 400 | 1.8 | 33 | 42 | 0.072 | 440 | 2.20 | 30.5 | 0.14 | 3 | 0.038 | |
| SKM300GA12T4 | 422 | 300 | 1.85 | 23.4 | 26 | 0.11 | 353 | 2.17 | 22.2 | 0.17 | 4 | 0.038 | |
| SKM400GA12T4 | 616 | 400 | 1.8 | 28 | 44 | 0.072 | 440 | 2.20 | 37 | 0.14 | 4 | 0.038 | |
| SKM600GA12T4 | 913 | 600 | 1.8 | 74 | 63 | 0.049 | 707 | 2.14 | 38 | 0.086 | 4 | 0.038 | |
| SKM50GB12T4 | 81 | 50 | 1.85 | 5.5 | 4.5 | 0.53 | 65 | 2.22 | 3.8 | 0.84 | 2 | 0.05 |  |
| SKM75GB12T4 | 115 | 75 | 1.85 | 11 | 6.9 | 0.38 | 97 | 2.17 | 4.7 | 0.58 | 2 | 0.05 | |
| SKM100GB12T4 | 160 | 100 | 1.8 | 15 | 10.2 | 0.27 | 121 | 2.20 | 5.9 | 0.48 | 2 | 0.05 | |
| SKM100GB12T4G | 154 | 100 | 1.85 | 16.1 | 8.6 | 0.29 | 118 | 2.22 | 6 | 0.49 | 3 | 0.038 | |
| SKM150GB12T4 | 232 | 150 | 1.8 | 19.2 | 15.8 | 0.19 | 189 | 2.14 | 13 | 0.31 | 2 | 0.05 | |
| SKM150GB12T4G | 223 | 150 | 1.85 | 18.7 | 14.1 | 0.2 | 183 | 2.17 | 9 | 0.32 | 3 | 0.038 | |
| SKM200GB12T4 | 313 | 200 | 1.8 | 21 | 20 | 0.14 | 229 | 2.20 | 13 | 0.26 | 3 | 0.038 | |
| SKM300GB12T4 | 422 | 300 | 1.85 | 27 | 29 | 0.11 | 353 | 2.17 | 23 | 0.17 | 3 | 0.038 | |
| SKM400GB12T4 | 616 | 400 | 1.8 | 33 | 42 | 0.072 | 440 | 2.20 | 30.5 | 0.14 | 3 | 0.038 | |
| SKM150GM12T4G [2] | 229 | 150 | 1.85 | 19.2 | 15.8 | 0.19 | 187 | 2.17 | 13 | 0.31 | 3 | 0.038 |  |
| SKM200GM12T4 [2] | 313 | 200 | 1.8 | 21 | 20 | 0.14 | 229 | 2.20 | 13 | 0.26 | 3 | 0.038 | |
| SKM300GM12T4 [2] | 422 | 300 | 1.85 | 27 | 29 | 0.11 | 353 | 2.17 | 23 | 0.17 | 3 | 0.038 | |
| SKM400GM12T4 [2] | 616 | 400 | 1.8 | 33 | 42 | 0.072 | 440 | 2.20 | 30.5 | 0.14 | 3 | 0.038 | |
| SKM300GBD12T4 [2] | 422 | 300 | 1.85 | 27 | 29 | 0.11 | 56 | 2.41 | - | 0.94 | 3 | 0.038 |  |

# Modules - IGBT - SEMITRANS

| Type | IGBT | | | | | | Diode | | | | Case | | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_C$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on}$ | $E_{off}$ | $R_{th(j-c)}$ | $I_F$ @$T_C$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | $R_{th(j-c)}$ | Case | $R_{th(c-s)}$ | |
| | A | A | V | mJ | mJ | K/W | A | V | mJ | K/W | | K/W | |
| **1200 V - IGBT 3 (Trench)** | | | | | | | | | | | | | |
| SKM195GAL126D | 220 | 150 | 1.7 | 16 | 24.5 | 0.16 | 170 | 2.45 | 5.8 | 0.32 | 2 | 0.05 |  |
| SKM200GAL126D | 260 | 150 | 1.7 | 18 | 24 | 0.13 | 200 | 1.50 | 18 | 0.3 | 3 | 0.038 | |
| SKM400GAL126D | 470 | 300 | 1.7 | 29 | 48 | 0.08 | 400 | 1.64 | 27 | 0.18 | 3 | 0.038 | |
| SKM600GAL126D | 660 | 400 | 1.7 | 39 | 64 | 0.055 | 490 | 1.67 | 41 | 0.125 | 3 | 0.038 | |
| SKM600GA126D | 660 | 400 | 1.7 | 39 | 64 | 0.055 | 490 | 1.67 | 41 | 0.125 | 4 | 0.038 | |
| SKM800GA126D | 960 | 600 | 1.7 | 65 | 95 | 0.042 | 680 | 1.69 | 59 | 0.09 | 4 | 0.038 | |
| SKM195GB126D | 220 | 150 | 1.7 | 16 | 24.5 | 0.16 | 170 | 2.45 | 5.8 | 0.32 | 2 | 0.05 |  |
| SKM200GB126D | 260 | 150 | 1.7 | 18 | 24 | 0.13 | 200 | 1.64 | 18 | 0.3 | 3 | 0.038 | |
| SKM300GB126D | 310 | 200 | 1.7 | 21 | 33 | 0.12 | 250 | 1.67 | 18 | 0.25 | 3 | 0.038 | |
| SKM400GB126D | 470 | 300 | 1.7 | 29 | 48 | 0.08 | 400 | 1.64 | 27 | 0.18 | 3 | 0.038 | |
| SKM600GB126D | 660 | 400 | 1.7 | 39 | 64 | 0.055 | 490 | 1.67 | 41 | 0.125 | 3 | 0.038 | |
| **1200 V - NPT IGBT (Ultrafast)** | | | | | | | | | | | | | |
| SKM200GAL125D | 200 | 150 | 3.3 | 14 | 8 | 0.09 | 200 | 2.06 | 8 | 0.25 | 3 | 0.038 |  |
| SKM400GAL125D | 400 | 300 | 3.3 | 17 | 18 | 0.05 | 390 | 2.06 | 16 | 0.125 | 3 | 0.038 | |
| SKM200GAR125D | 200 | 150 | 3.3 | 14 | 8 | 0.09 | 200 | 2.06 | 8 | 0.25 | 3 | 0.038 |  |
| SKM400GAR125D | 400 | 300 | 3.3 | 17 | 18 | 0.05 | 390 | 2.06 | 16 | 0.125 | 3 | 0.038 | |
| SKM600GA125D | 580 | 400 | 3.3 | 30 | 22 | 0.041 | 500 | 2.00 | 24 | 0.09 | 4 | 0.038 | |
| SKM800GA125D | 760 | 600 | 3.2 | 88 | 48 | 0.03 | 720 | 2.3 | 28 | 0.07 | 4 | 0.038 | |
| SKM100GB125DN | 100 | 75 | 3.3 | 9 | 3.5 | 0.18 | 95 | 2.06 | 4 | 0.5 | 2N | 0.05 |  |
| SKM200GB125D | 200 | 150 | 3.3 | 14 | 8 | 0.09 | 200 | 2.06 | 8 | 0.25 | 3 | 0.038 | |
| SKM300GB125D | 300 | 200 | 3.3 | 16 | 11 | 0.075 | 260 | 2.00 | 13 | 0.18 | 3 | 0.038 | |
| SKM400GB125D | 400 | 300 | 3.3 | 17 | 18 | 0.05 | 390 | 2.06 | 16 | 0.125 | 3 | 0.038 | |
| **1700 V - IGBT 3 (Trench)** | | | | | | | | | | | | | |
| SKM145GAL176D | 160 | 100 | 2 | 60 | 38 | 0.19 | 140 | 1.6 | 27.5 | 0.36 | 2 | 0.05 |  |
| SKM200GAL176D | 260 | 150 | 2 | 93 | 58 | 0.12 | 210 | 1.55 | 31 | 0.25 | 3 | 0.038 | |
| SKM400GAL176D | 432 | 300 | 2 | 170 | 118 | 0.075 | 440 | 1.55 | 78 | 0.125 | 3 | 0.038 | |
| SKM600GA176D | 660 | 400 | 2 | 255 | 155 | 0.044 | 600 | 1.6 | 102 | 0.09 | 4 | 0.038 | |
| SKM800GA176D | 830 | 600 | 2 | 335 | 245 | 0.04 | 630 | 1.6 | 155 | 0.07 | 4 | 0.038 | |
| SKM75GB176D | 80 | 50 | 2 | 25 | 18 | 0.38 | 80 | 1.50 | 14.5 | 0.55 | 2 | 0.05 |  |
| SKM100GB176D | 125 | 75 | 2 | 44 | 28.5 | 0.24 | 100 | 1.6 | 21.4 | 0.45 | 2 | 0.05 | |
| SKM145GB176D | 160 | 100 | 2 | 60 | 38 | 0.19 | 140 | 1.6 | 27.5 | 0.36 | 2 | 0.05 | |
| SKM200GB176D | 260 | 150 | 2 | 93 | 58 | 0.12 | 210 | 1.55 | 31 | 0.25 | 3 | 0.038 | |
| SKM400GB176D | 432 | 300 | 2 | 170 | 118 | 0.075 | 440 | 1.55 | 78 | 0.125 | 3 | 0.038 | |

# Modules - IGBT - SEMITRANS

| Type | IGBT | | | | | | Diode | | | | Case | | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_C$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on}$ | $E_{off}$ | $R_{th(j-c)}$ | $I_F$ @$T_C$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | $R_{th(j-c)}$ | Case | $R_{th(c-s)}$ | |
| | A | A | V | mJ | mJ | K/W | A | V | mJ | K/W | | K/W | |
| **1700 V - NPT IGBT (Standard)** | | | | | | | | | | | | | |
| **SKM200GAR173D** [1] | 220 | 150 | 3.4 | 95 | 45 | 0.1 | 150 | 2.2 | 21 | 0.32 | 3 | 0.038 |  |
| **SKM200GAL173D** [1] | 220 | 150 | 3.4 | 95 | 45 | 0.1 | 150 | 2.2 | 21 | 0.32 | 3 | 0.038 |  |
| **SKM400GA173D** [1] | 440 | 300 | 3 | 180 | 10 | 0.05 | 300 | 2.2 | 46 | 0.17 | 4 | 0.038 | |
| **SKM75GB173D** [1] | 75 | 50 | 3.4 | 18 | 13 | 0.25 | 60 | 2.2 | 10.5 | 0.75 | 2 | 0.05 |  |
| **SKM100GB173D** [1] | 110 | 75 | 3.4 | 35 | 21 | 0.2 | 80 | 2.2 | 11.5 | 0.63 | 2 | 0.05 | |
| **SKM150GB173D** [1] | 150 | 100 | 3.4 | 60 | 32 | 0.125 | 125 | 2.2 | 14 | 0.4 | 3 | 0.038 | |
| **SKM200GB173D** [1] | 220 | 150 | 3.4 | 95 | 45 | 0.1 | 150 | 2.2 | 21 | 0.32 | 3 | 0.038 | |

**Footnotes**

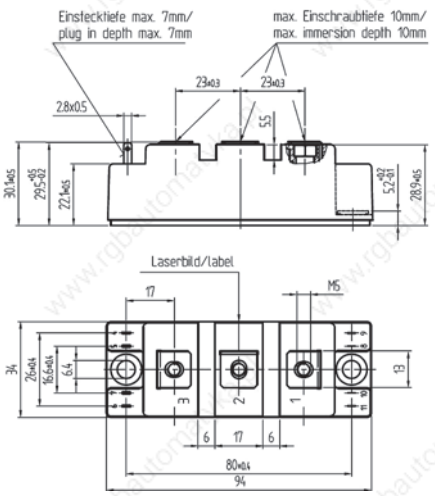
[1] Not for New Design

[2] New

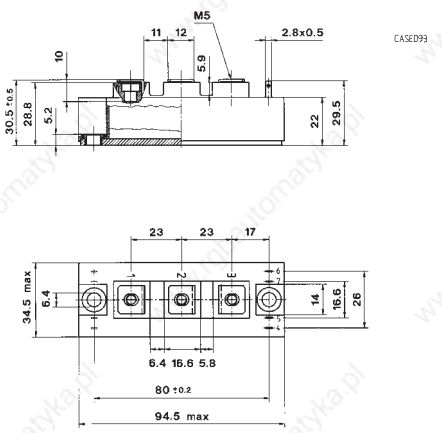
# Modules - IGBT - SEMITRANS

## Cases

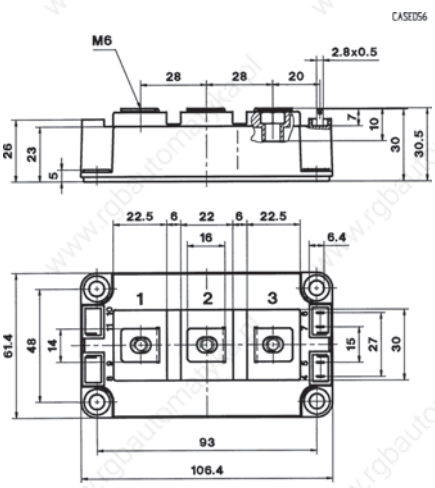
### SEMITRANS 2



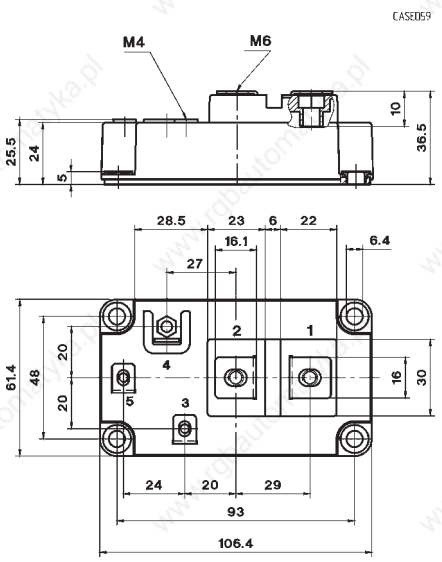

### SEMITRANS 2N



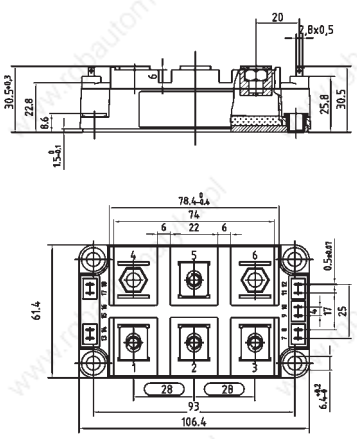

### SEMITRANS 3



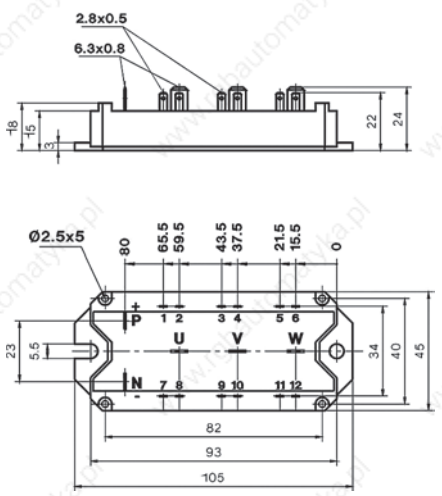

### SEMITRANS 4




### SEMITRANS 5



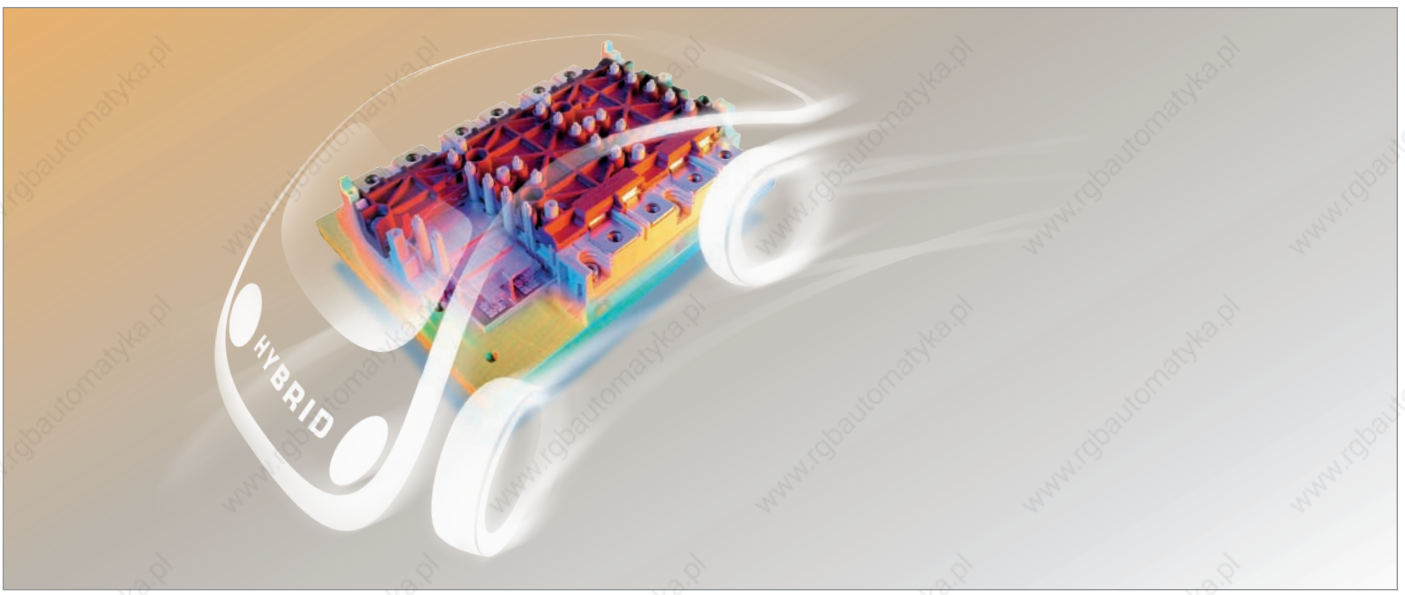

### SEMITRANS 6




Dimensions in mm

# SKiM® 63 / 93

## 100 % solder-free ensures durability




### Applications

SKiM 63/93, sintered modules with no base plate, offer a number of possibilities for boosting the reliability of inverters. The SKiM 63/93 is used in many different applications such as electric powertrains in electric vehicles, hybrid cars and utility vehicles, heavy-duty construction machinery, or even to provide leading-edge performance in race cars.

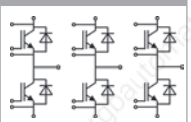
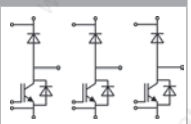
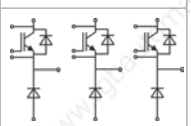
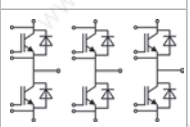
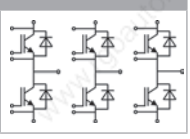
### Product range

The SKiM 63/93 modules combine 3-phase inverter topology with temperature control for all 3 phases in 600 V, 650 V, 1200 V, 1700 V voltage. Power ranges from 20 kW - 180 kW, nominal currents range from 300 A - 900 A. A 600 V / 650 V driver board and an optimized water cooler are available for fast and customer-friendly evaluation.

### Benefits

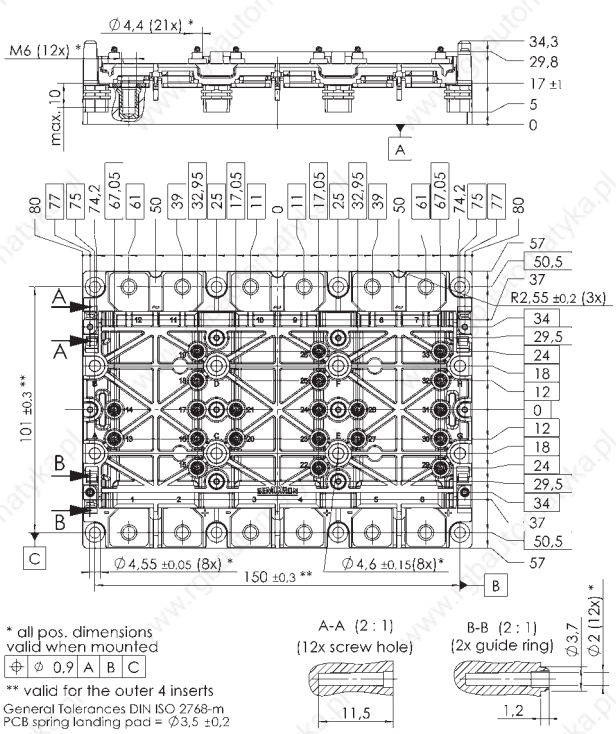
SKiM solder-free technology completely eliminates solder connections, which can be detrimental to service life. The reliability of the inverter, even under substantial active and passive temperature swings, can be increased by several factors. Testimony to this is best-in-class results in power cycle and temperature cycle tests. Thanks to the baseplate-less design, the thickness of the thermal paste layer can be reduced by a factor of 4 compared to conventional modules. Hand in hand with the optimized thermal layout, operating temperatures are reduced significantly. Temperatures are largely homogenous in the 3 phases of the inverter. All SKiM modules come with pre-applied thermal paste. No solder steps are required for SKiM driver board and heat sink mounting, making assembly easy and cost-efficient.

# Modules - IGBT - SKiM 63 / 93

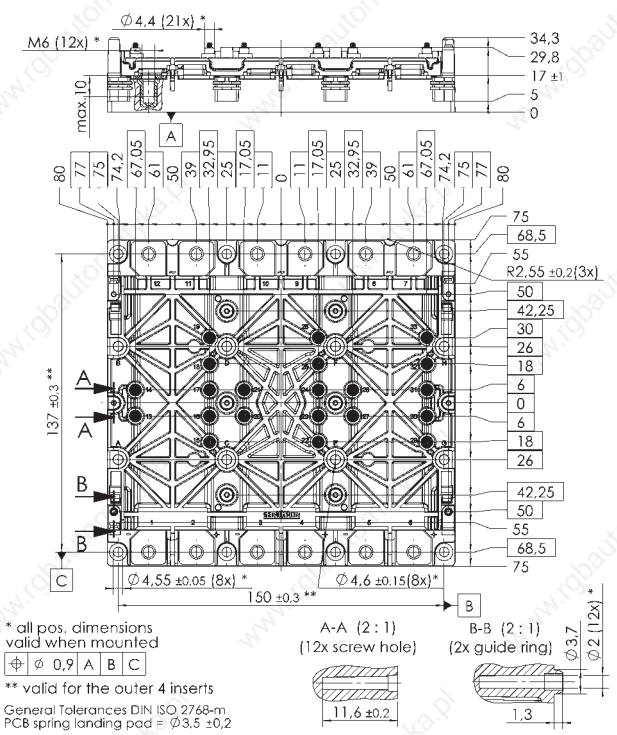
| Type | IGBT | | | | | | Diode | | | | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_S$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on}$ | $E_{off}$ | $R_{th(j-s)}$ | $I_F$ @$T_S$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | $R_{th(j-s)}$ | | |
| | A | A | V | mJ | mJ | K/W | A | V | mJ | K/W | | |
| **600 V - IGBT 3 (Trench)** | | | | | | | | | | | | |
| **SKiM406GD066HD** | 468 | 400 | 1.45 | 8 | 25 | 0.135 | 360 | 1.5 | 12 | 0.243 | 63 |  |
| **SKiM606GD066HD** | 641 | 600 | 1.45 | 16 | 53 | 0.105 | 453 | 1.6 | 21 | 0.201 | 63 | |
| **SKiM909GD066HD** | 899 | 900 | 1.45 | 36 | 88 | 0.078 | 712 | 1.5 | 29 | 0.135 | 93 | |
| **1200 V - IGBT 4 (Trench)** | | | | | | | | | | | | |
| **SKiM609GAL12E4** | 748 | 600 | 1.85 | 136 | 83 | 0.068 | 1397 | 1.7 | 39 | 0.048 | 93 |  |
| **SKiM609GAR12E4** | 748 | 600 | 1.85 | 136 | 83 | 0.068 | 1397 | 1.7 | 39 | 0.048 | 93 |  |
| **SKiM306GD12E4** | 410 | 300 | 1.85 | 19 | 39 | 0.116 | 302 | 2.1 | 21 | 0.218 | 63 |  |
| **SKiM459GD12E4** | 554 | 450 | 1.85 | 22 | 57 | 0.092 | 438 | 2.1 | 40 | 0.155 | 93 | |
| **1700 V - IGBT 4 (Trench)** | | | | | | | | | | | | |
| **SKiM429GD17E4HD** | 595 | 420 | 1.9 | 245 | 180 | 0.079 | 413 | 1.7 | 99 | 0.169 | 93 |  |

## Cases

### SKiM 63




### SKiM 93



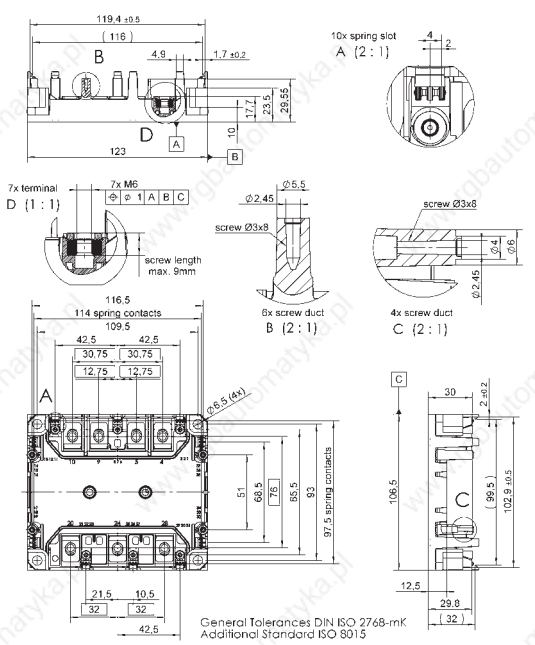

**Dimensions in mm**

# Modules - IGBT - SKiM 4 / 5

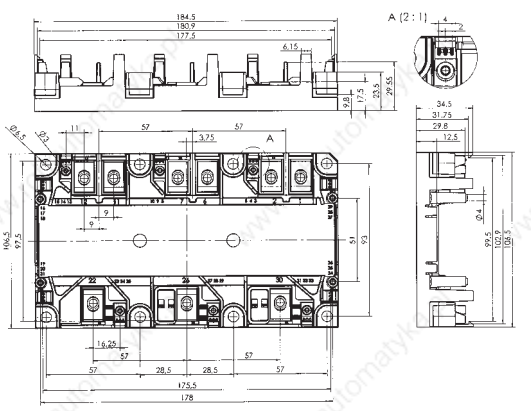
| Type | IGBT | | | | | | Diode | | | | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_s$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on}$ | $E_{off}$ | $R_{th(j-s)}$ | $I_F$ @$T_s$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | $R_{th(j-s)}$ | | |
| | A | A | V | mJ | mJ | K/W | A | V | mJ | K/W | | |
| **1200 V - IGBT 3 (Trench)** | | | | | | | | | | | | |
| **SKiM200GD126D** | - | 200 | 1.65 | 15 | 25 | - | 152 | 2.4 | - | 0.35 | 4 | |
| **SKiM 300GD126D** | 265 | 300 | 1.7 | 28 | 47 | 0.2 | 260 | 1.9 | - | 0.285 | 4 | |
| **SKiM 400GD126DM** | 330 | 300 | 1.7 | 29 | 46 | 0.134 | 300 | 1.9 | - | 0.19 | 4 | |
| **SKiM300GD126DL** | 265 | 300 | 1.65 | 28 | 47 | 0.2 | 260 | 1.9 | - | 0.285 | 4 | |
| **SKiM400GD126DLM** | 330 | 300 | 1.65 | 29 | 46 | 0.134 | 300 | 1.9 | - | 0.19 | 4 | |
| **SKiM 450GD126D** | 390 | 450 | 1.7 | 42 | 70 | 0.13 | 345 | 1.9 | - | 0.19 | 5 | |
| **SKiM 601GD126DM** | 480 | 450 | 1.7 | 42 | 70 | 0.09 | 450 | 1.9 | - | 0.125 | 5 | |
| **SKiM450GD126DL** | 390 | 450 | 1.65 | 42 | 70 | 0.13 | 345 | 1.9 | - | 0.19 | 5 | |
| **SKiM455GD12T4D1** | 390 | 450 | 1.8 | 42 | 70 | 0.13 | 345 | 1.9 | - | 0.19 | 5 | |
| **SKiM455GD12T4DM1** | 390 | 450 | 1.8 | 42 | 70 | 0.13 | 345 | 1.9 | - | 0.19 | 5 | |
| **SKiM600GD126DLM** | 480 | 450 | 1.65 | 42 | 70 | 0.09 | 450 | 1.9 | - | 0.125 | 5 | |
| **1200 V - IGBT 4 (Trench)** | | | | | | | | | | | | |
| **SKiM304GD12T4D** | 312 | 300 | 1.8 | - | - | 0.19 | 221 | 2.3 | - | 0.25 | 4 | |
| **1700 V - IGBT 3 (Trench)** | | | | | | | | | | | | |
| **SKiM 120GD176D** | 110 | 125 | 2 | 72 | 46 | 0.4 | 105 | 1.6 | 22 | 0.56 | 4 | |
| **SKiM 220GD176DH4** | 220 | 250 | 2 | 145 | 100 | 0.21 | 220 | 1.7 | 65 | 0.26 | 4 | |
| **SKiM 270GD176D** | 260 | 300 | 2 | 170 | 120 | 0.175 | 215 | 1.7 | - | 0.29 | 5 | |

## Cases

### SKiM 4



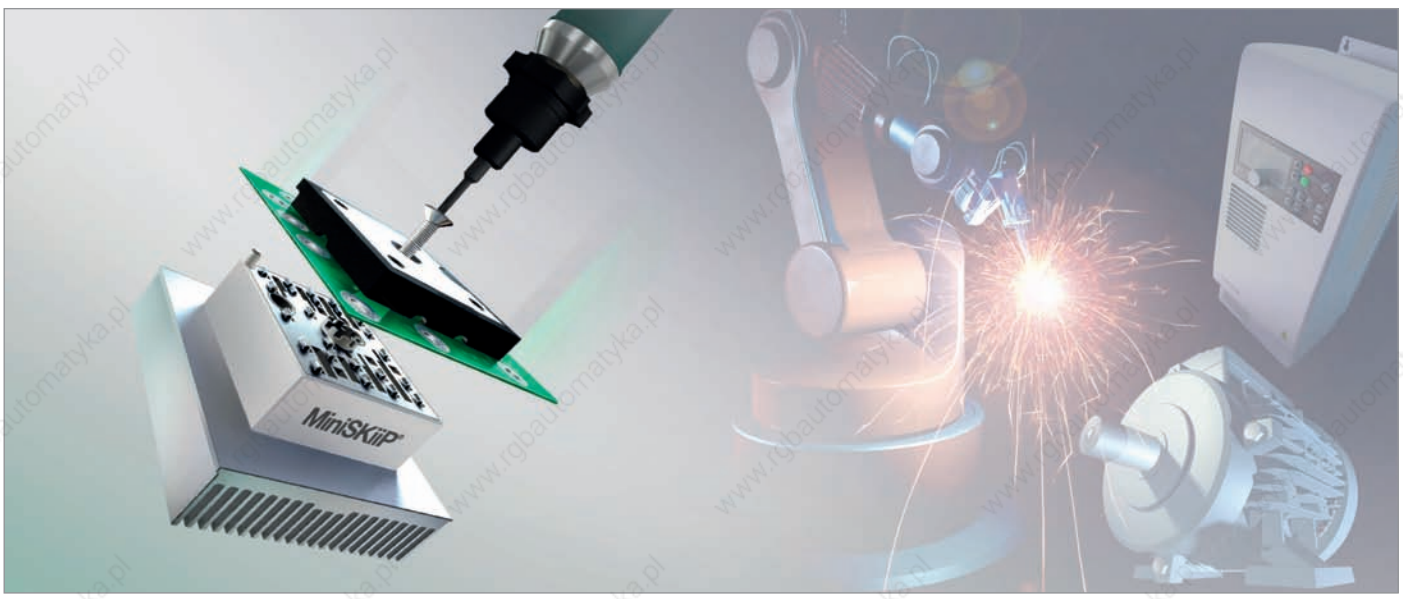

### SKiM 5




**Dimensions in mm**

# MiniSKiiP®

## Fast, cost efficient and reliable one screw mounting




### Applications

Thanks to the use of spring contact technology, MiniSKiiP modules enable fast single-screw or double-screw assembly, facilitating quick and reliable inverter manufacture. With more than 14 years of field experience and more than 15 million modules in the field, this module platform has proven successful in every standard application. The main applications are all kinds of frequency inverters, like standard drives, stand alone drives, servo drives, system drives, solar inverters, UPS systems and welding machines. Thanks to the reliability of spring contacts applications like agricultural vehicles or pitch motors of windmills benefit from the MiniSKiiP technology.

### Product range

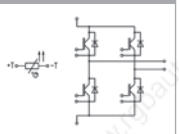
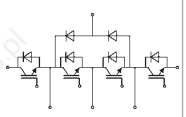
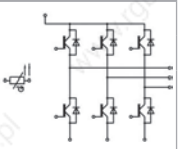
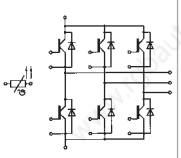
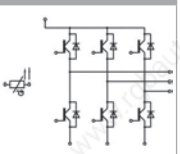
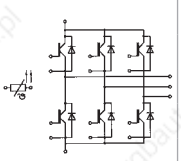
MiniSKiiP modules are designed for 600 V and 1200 V chip off-state voltages with 4-150 A nominal chip currents and feature Trench IGBT technology in combination with SEMIKRON CAL diode. In the 1200 V range, the latest Trench IGBT4 technology is used in combination with the CAL I4 diode. These chips may be used for a junction temperature of up to 175°C. In addition to the CIB configuration and 6-pack modules, non-controlled rectifiers with brake chopper, as well as half-controlled rectifiers with brake chopper are also available.

Modules for 3-level inverters with output powers of 30-80 kVA and a maximum blocking voltage of 650 V, as well as SiC devices are also available.

### Benefits

An important mechanical feature in this module is the easy-assembly and service-friendly spring-contact for load and gate terminals. Compared to conventional soldered modules, where expensive automaticn soldering equipment is needed in time-consuming soldering processes, no special tools are needed to assemble MiniSKiiP modules - instead, a single-screw connection is used. The printed circuit board (PCB), power module and heat sink are firmly joined via the pressure lid.
This connection technology has a number of other advantages: the customer's PCB can be more flexible in design, as the power circuit board does not have to include holes for solder pins. The springs provide a flexible connection between the PCB and the power circuitry that is far superior to a soldered joint, especially under thermal or mechanical load conditions which can affect lifetime. Thanks to the good contact force provided by the springs, an air-tight, reliable electrical connection is ensured.

# Modules - IGBT - MiniSKiiP

| Type | IGBT | | | | | | Diode | | | | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_S$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on}$ | $E_{off}$ | $R_{th(j-s)}$ | $I_F$ @$T_S$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | $R_{th(j-s)}$ | | |
| | A | A | V | mJ | mJ | K/W | A | V | mJ | K/W | | |
| **600 V - IGBT 3 (Trench)** | | | | | | | | | | | | |
| **SKiiP 16GH066V1** | 65 | 50 | 1.45 | 1.7 | 1.7 | 0.95 | 56 | 1.50 | 1.3 | 1.6 | II 1 |  |
| **SKiiP 27GH066V1** | 88 | 75 | 1.45 | 2.7 | 3 | 0.75 | 77 | 1.50 | 1.8 | 1.2 | II 2 | |
| **SKiiP 28GH066V1** | 112 | 100 | 1.45 | 3.4 | 3.5 | 0.6 | 112 | 1.30 | 3.3 | 0.8 | II 2 | |
| **650 V - IGBT 3 (Trench)** | | | | | | | | | | | | |
| **SKiiP 26MLI07E3V1** [1] | - | 75 | 1.45 | - | - | - | - | 1.5 | - | - | II 2 |  |
| **SKiiP 27MLI07E3V1** [1] | - | 100 | 1.45 | - | - | - | - | 1.4 | - | - | II 2 | |
| **SKiiP 28MLI07E3V1** [1] | - | 150 | 1.33 | - | - | - | - | 1.4 | - | - | II 2 | |
| **SKiiP 39MLI07E3V1** [1] | - | 200 | 1.45 | - | - | - | - | 1.4 | - | - | II 3 | |
| **1200 V - IGBT 3 (Trench)** | | | | | | | | | | | | |
| **SKiiP 11AC126V1** [2] | 16 | 8 | 1.7 | 0.9 | 1 | 1.5 | 14 | 1.90 | 0.9 | 2.5 | II 1 |  |
| **SKiiP 12AC126V1** [2] | 28 | 15 | 1.7 | 1.7 | 1.9 | 1.15 | 26 | 1.60 | 1.2 | 1.95 | II 1 | |
| **SKiiP 13AC126V1** [2] | 41 | 25 | 1.7 | 4.1 | 3.1 | 0.9 | 30 | 1.80 | 2.2 | 1.7 | II 1 | |
| **SKiiP 23AC126V1** [2] | 41 | 25 | 1.7 | 3.7 | 3.1 | 0.9 | 30 | 1.80 | 2.6 | 1.7 | II 2 |  |
| **SKiiP 24AC126V1** [2] | 52 | 35 | 1.7 | 4.2 | 4.4 | 0.75 | 38 | 1.80 | 3.5 | 1.5 | II 2 | |
| **SKiiP 25AC126V1** [2] | 73 | 50 | 1.7 | 5.8 | 6.5 | 0.55 | 62 | 1.60 | 5.1 | 1 | II 2 | |
| **SKiiP 26AC126V1** [2] | 88 | 70 | 1.7 | 9 | 7.7 | 0.5 | 91 | 1.50 | 7.5 | 0.7 | II 2 | |
| **SKiiP 37AC126V2** [2] | 97 | 75 | 1.7 | 9.6 | 8.7 | 0.45 | 90 | 1.60 | 9.6 | 0.7 | II 3 | |
| **SKiiP 38AC126V2** [2] | 118 | 105 | 1.7 | 13.1 | 13 | 0.4 | 118 | 1.60 | 11.2 | 0.55 | II 3 | |
| **SKiiP 39AC126V2** [2] | 157 | 140 | 1.7 | 19.9 | 17.2 | 0.3 | 167 | 1.50 | 16.2 | 0.4 | II 3 | |
| **1200 V - IGBT 4 (Trench)** | | | | | | | | | | | | |
| **SKiiP 11AC12T4V1** | 12 | 8 | 1.85 | 0.87 | 0.75 | 1.84 | 15 | 2.3 | 0.53 | 2.53 | II 1 |  |
| **SKiiP 12AC12T4V1** | 18 | 15 | 1.85 | 1.65 | 1.5 | 1.3 | 23 | 2.4 | 0.79 | 1.92 | II 1 | |
| **SKiiP 13AC12T4V1** | 41 | 25 | 1.85 | 3.7 | 2.4 | 1 | 32 | 2.4 | 1.64 | 1.52 | II 1 | |
| **SKiiP 23AC12T4V1** | 41 | 25 | 1.85 | 3.7 | 2.4 | 1 | 32 | 2.4 | 1.64 | 1.52 | II 2 |  |
| **SKiiP 24AC12T4V1** | 52 | 35 | 1.85 | 3.7 | 3 | 0.85 | 44 | 2.3 | 2.3 | 1.2 | II 2 | |
| **SKiiP 25AC12T4V1** | 69 | 50 | 1.85 | 6 | 4.5 | 0.71 | 60 | 2.2 | 3.2 | 0.95 | II 2 | |
| **SKiiP 26AC12T4V1** | 90 | 70 | 1.85 | 9.5 | 7.1 | 0.55 | 83 | 2.2 | 5.6 | 0.75 | II 2 | |
| **SKiiP 37AC12T4V1** | 90 | 75 | 1.85 | 11.5 | 6.8 | 0.58 | 83 | 2.2 | 5.5 | 0.75 | II 3 | |
| **SKiiP 38AC12T4V1** | 115 | 100 | 1.8 | 13.7 | 9.7 | 0.48 | 100 | 2.2 | 6.5 | 0.66 | II 3 | |
| **SKiiP 39AC12T4V1** | 167 | 150 | 1.85 | 22.5 | 14 | 0.33 | 136 | 2.1 | 11.4 | 0.52 | II 3 | |

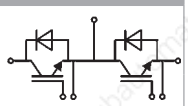
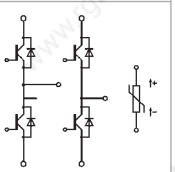
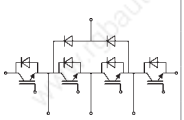
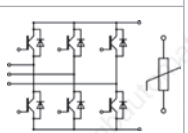
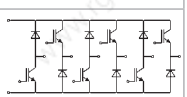
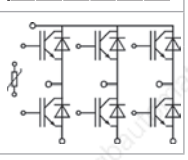
**For detailed case drawings please see page 38**

## Footnotes

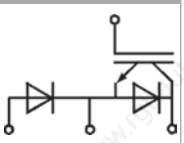
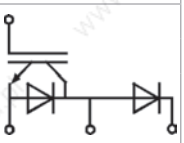
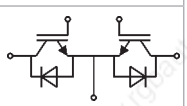
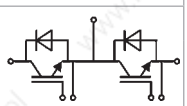
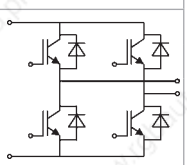
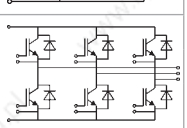
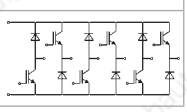
[1] New

[2] Not for New Design

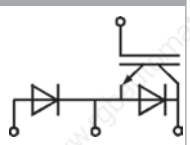
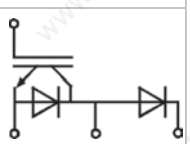
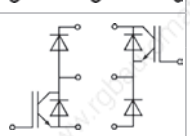
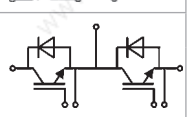
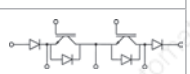
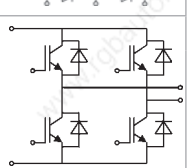
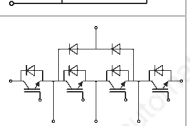
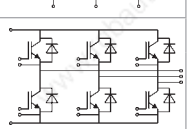
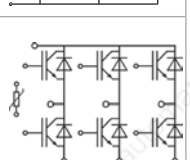
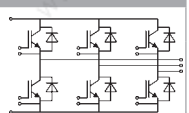
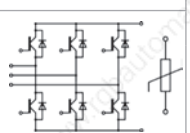
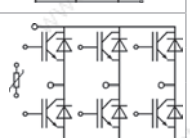
# Modules - IGBT - SEMITOP

| Type | IGBT | | | | | | Diode | | | | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_s$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on}$ | $E_{off}$ | $R_{th(j-s)}$ | $I_F$ @$T_s$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | $R_{th(j-s)}$ | | |
| | A | A | V | mJ | mJ | K/W | A | V | mJ | K/W | | |
| **600 V - IGBT 3 (Trench)** | | | | | | | | | | | | |
| **SK 75 GB 066 T** | 77 | 75 | 1.45 | 3.1 | 2.8 | 0.94 | 62 | 1.35 | 0.85 | 1.55 | 3 |  |
| **SK 100 GB 066 T** | 96 | 100 | 1.45 | 7 | 6 | 0.78 | 108 | 1.35 | 1.7 | 0.91 | 3 | |
| **SK 150 GB 066 T** | 124 | 150 | 1.45 | 6.25 | 5.7 | 0.55 | 135 | 1.35 | 1.7 | 0.73 | 3 | |
| **SK 30 GBB 066 T** | 40 | 30 | 1.45 | 0.97 | 1.77 | 1.65 | 36 | 1.45 | 0.26 | 2.1 | 3 |  |
| **SK 50 GBB 066 T** | 60 | 50 | 1.45 | 2.2 | 1.73 | 1.11 | 56 | 1.50 | 0.72 | 1.7 | 3 | |
| **SK 75 GBB 066 T** | 77 | 75 | 1.45 | 3.1 | 2.8 | 0.94 | 77 | 1.35 | 0.85 | 1.55 | 3 | |
| **SK 20 MLI 066** | 30 | 20 | 1.45 | 0.4 | 1.07 | 1.95 | 30 | 1.60 | 0.2 | 2.46 | 3 |  |
| **SK 30 MLI 066** | 40 | 30 | 1.45 | 0.97 | 1.77 | 1.65 | 37 | 1.50 | 0.26 | 2.3 | 3 | |
| **SK 50 MLI 066** | 60 | 50 | 1.45 | 1.46 | 2.02 | 1.11 | 56 | 1.50 | 1.07 | 1.7 | 3 | |
| **SK 75 MLI 066 T** | 83 | 75 | 1.45 | 1.7 | 2.8 | 0.75 | 92 | 1.50 | 1.1 | 1.2 | 4 | |
| **SK 100 MLI 066 T** | 105 | 100 | 1.45 | 2.5 | 4.2 | 0.65 | 110 | 1.35 | 1.9 | 0.9 | 4 | |
| **SK 150 MLI 066 T** | 151 | 150 | 1.45 | 2.7 | 5.9 | 0.55 | 115 | 1.50 | 2.6 | 0.72 | 4 | |
| **SK 75 GD 066 T** | 83 | 75 | 1.45 | 3.1 | 2.8 | 0.75 | 92 | 1.35 | 0.85 | 1.2 | 4 |  |
| **SK 100 GD 066 T** | 105 | 100 | 1.45 | 7 | 6 | 0.65 | 99 | 1.30 | 1.7 | 0.8 | 4 | |
| **SK 150 GD 066 T** | 151 | 150 | 1.45 | 6.25 | 5.7 | 0.55 | 198 | 1.30 | 1.7 | 0.54 | 4 | |
| **SK 200 GD 066 T** | 174 | 200 | 1.45 | 13.9 | 12 | 0.45 | 99 | 1.30 | 3.4 | 0.8 | 4 | |
| **SK 30 GAD 066 T** [1)] | 38 | 30 | 1.45 | 1.24 | 1.48 | 1.8 | 65 | 1.30 | 0.44 | 1.2 | 3 |  |
| **SK 20 GD 066 ET** | 30 | 20 | 1.45 | 0.34 | 0.63 | 1.95 | 31 | 1.45 | 0.2 | 2.46 | 3 |  |
| **SK 30 GD 066 ET** | 40 | 30 | 1.45 | 0.97 | 1.77 | 1.65 | 36 | 1.45 | 0.26 | 2.1 | 3 | |
| **SK 50 GD 066 ET** | 60 | 50 | 1.45 | 2.2 | 1.73 | 1.11 | 56 | 1.50 | 0.72 | 1.7 | 3 | |

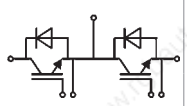
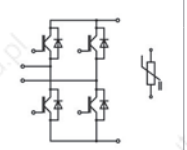
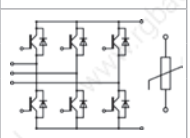
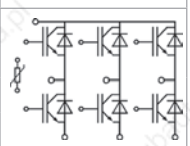
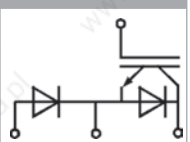
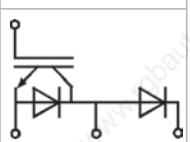
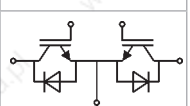
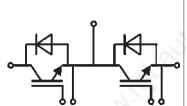
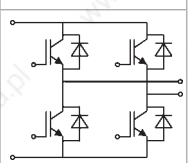
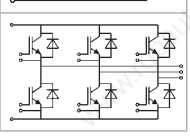
# Modules - IGBT - SEMITOP

| Type | IGBT | | | | | | Diode | | | | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_S$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on}$ | $E_{off}$ | $R_{th(j-s)}$ | $I_F$ @$T_S$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | $R_{th(j-s)}$ | | |
| | A | A | V | mJ | mJ | K/W | A | V | mJ | K/W | | |
| **600 V - NPT IGBT (Standard)** | | | | | | | | | | | | |
| **SK 25 GAR 063** [1] | 30 | 30 | - | 1.25 | 0.9 | 1.4 | 38 | 1.45 | - | 1.7 | 1 |  |
| **SK 45 GAR 063** [1] | 45 | 50 | 2.1 | 1.4 | 1.2 | 1 | 57 | 1.45 | 0.25 | 1.2 | 2 | |
| **SK 70 GAR 063** [1] | 81 | 100 | 2.1 | 4 | 3 | 0.6 | 22 | 1.45 | 0.1 | 2.3 | 2 | |
| **SK 25 GAL 063** [1] | 30 | 30 | - | 1.25 | 0.9 | 1.4 | 38 | 1.45 | - | 1.7 | 1 |  |
| **SK 45 GAL 063** [1] | 45 | 50 | 2.1 | 1.4 | 1.2 | 1 | 57 | 1.45 | 0.25 | 1.2 | 2 | |
| **SK 70 GAL 063** [1] | 81 | 100 | 2.1 | 4 | 3 | 0.6 | 22 | 1.45 | 0.1 | 2.3 | 2 | |
| **SK 80 GM 063** [1] | 81 | 100 | 2 | 3 | 2.3 | 0.6 | 105 | 1.30 | 0.2 | 1.2 | 2 |  |
| **SK 45 GB 063** [1] | 45 | 50 | 2.1 | 1.4 | 1.2 | 1 | 57 | 1.45 | 0.25 | 1.2 | 2 |  |
| **SK 80 GB 063** [1] | 81 | 100 | 2.1 | 4 | 3 | 0.6 | 79 | 1.40 | 1.2 | 0.9 | 3 | |
| **SK 15 GH 063** [1] | 20 | 15 | 2 | 0.71 | 0.4 | 1.9 | 20 | 1.45 | 0.45 | 1.2 | 2 |  |
| **SK 25 GH 063** [1] | 30 | 30 | 2.1 | 1.1 | 0.8 | 1.4 | 36 | 1.45 | 0.25 | 1.7 | 2 | |
| **SK 45 GH 063** [1] | 45 | 50 | 2.1 | 1.4 | 1.2 | 1 | 57 | 1.30 | 0.9 | 1.2 | 3 | |
| **SK 13 GD 063** [1] | 18 | 10 | 2.1 | 0.6 | 0.4 | 2 | 22 | 1.45 | 0.1 | 2.3 | 3 |  |
| **SK 25 GD 063** [1] | 30 | 30 | 2.1 | 1.3 | 0.9 | 1.4 | 36 | 1.45 | 0.25 | 1.7 | 3 | |
| **SK 45 GD 063** [1] | 45 | 50 | 2.1 | 1.4 | 1.2 | 1 | 36 | 1.45 | 0.25 | 1.7 | 3 | |
| **SK 25 GAD 063 T** [1] | 30 | 30 | 2.1 | 1.3 | 0.9 | 1.4 | 36 | 1.45 | 0.25 | 1.7 | 3 |  |

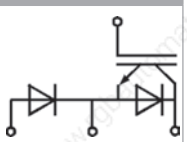
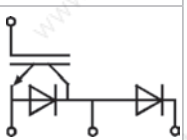
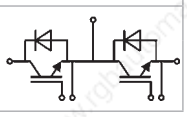
# Modules - IGBT - SEMITOP

| Type | IGBT | | | | | | Diode | | | | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_S$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on}$ | $E_{off}$ | $R_{th(j-s)}$ | $I_F$ @$T_S$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | $R_{th(j-s)}$ | | |
| | A | A | V | mJ | mJ | K/W | A | V | mJ | K/W | | |
| **600 V - NPT IGBT (Ultrafast)** | | | | | | | | | | | | |
| **SK 50 GAR 065** | 54 | 60 | 2 | 1.1 | 0.7 | 0.85 | 57 | 1.30 | 0.2 | 1.2 | 2 |  |
| **SK 50 GAL 065** | 54 | 60 | 2 | 1.1 | 0.7 | 0.85 | 57 | 1.30 | 0.2 | 1.2 | 2 |  |
| **SK 55 GARL 065 E** | 54 | 60 | 1.7 | 1.1 | 0.76 | 0.85 | 36 | 1.45 | 0.9 | 1.7 | 3 |  |
| **SK 75 GARL 065 E** | 80 | 90 | 1.7 | 2.71 | 2.75 | 0.6 | 57 | 1.30 | 0.2 | 1.2 | 3 | |
| **SK 25 GB 065** [1] | 30 | 30 | 1.8 | 0.75 | 0.6 | 1.4 | 36 | 1.45 | 0.25 | 1.7 | 1 |  |
| **SK 50 GB 065** | 54 | 60 | 2 | 1.1 | 0.7 | 0.85 | 64 | 1.45 | 0.55 | 1.1 | 2 | |
| **SK 50 GARL 065 F** | 54 | 60 | 1.7 | 1.03 | 0.8 | 0.85 | 82 | 1.70 | - | 2.3 | 2 |  |
| **SK 50 GARL 065 USA** | 54 | 60 | 1.7 | 1.07 | 0.76 | 0.85 | 64 | 1.40 | - | 2.3 | 2 | |
| **SK 20 GH 065** [1] | 24 | 20 | 2 | 0.6 | 0.4 | 1.7 | 25 | 1.60 | - | 1.7 | 2 |  |
| **SK 50 GH 065 F** | 54 | 60 | 2 | 1.07 | 1.76 | 0.85 | 82 | 1.10 | 0.42 | 1.1 | 3 | |
| **SK 25 MLI 065** [1] | 30 | 30 | 1.8 | 0.75 | 0.6 | 1.4 | 36 | 1.45 | 0.32 | 1.7 | 3 |  |
| **SK 50 MLI 065** [1] | 54 | 60 | 1.8 | 1.07 | 0.76 | 0.85 | 36 | 1.45 | - | 1.1 | 3 | |
| **SK 9 GD 065** [1] | 11 | 6 | 2 | 0.22 | 0.12 | 2.6 | 22 | 1.40 | 0.31 | 2.3 | 2 |  |
| **SK 20 GD 065** [1] | 24 | 20 | 2 | 0.7 | 0.4 | 1.7 | 22 | 1.60 | 0.4 | 2.3 | 2 | |
| **SK 10 GD 065 ET** [1] | 17 | 10 | 2 | 0.18 | 0.13 | 2 | 22 | 1.30 | 0.18 | 2.3 | 3 |  |
| **SK 15 GD 065 ET** [1] | 20 | 15 | 2 | 0.3 | 0.22 | 1.9 | 22 | 1.40 | 0.24 | 2.3 | 3 | |
| **SK 20 GD 065 ET** [1] | 26 | 15 | 2 | 0.6 | 0.44 | 1.7 | 27 | 1.60 | - | 1.9 | 3 | |
| **SK 25 GD 065 ET** [1] | 30 | 30 | 2 | 0.8 | 0.55 | 1.4 | 36 | 1.45 | - | 1.7 | 3 | |
| **SK 35 GD 065 ET** | 45 | 50 | 2 | 1.3 | 0.6 | 1 | 36 | 1.90 | 0.9 | 1.7 | 3 | |
| **1200 V - IGBT 3 (Trench)** | | | | | | | | | | | | |
| **SK 8 GD 126** [1] | 15 | 8 | 1.7 | 0.78 | 0.96 | 2 | 13 | 1.90 | 20.6 | 2.8 | 2 |  |
| **SK 15 GD 126** [1] | 22 | 15 | 1.7 | 2 | 1.56 | 1.6 | 25 | 1.60 | 1.4 | 2.1 | 2 | |
| **SK 50 GD 126 T** | 68 | 50 | 1.7 | 4.6 | 6.3 | 0.6 | 62 | 1.35 | 3.6 | 1 | 4 |  |
| **SK 75 GD 126 T** | 88 | 75 | 1.7 | 11.3 | 10 | 0.5 | 91 | 1.46 | 6 | 0.7 | 4 | |
| **SK 100 GD 126 T** | 114 | 100 | 1.7 | 9.8 | 11.7 | 0.4 | 118 | 1.50 | 7.3 | 0.55 | 4 | |
| **SK 10 GD 126 ET** | 15 | 8 | 1.7 | 1 | 1 | 2 | 25 | 1.90 | 1.4 | 2.1 | 3 |  |
| **SK 15 GD 126 ET** | 22 | 15 | 1.7 | 2 | 1.8 | 1.6 | 25 | 1.60 | 1.4 | 2.1 | 3 | |
| **SK 25 GD 126 ET** | 32 | 25 | 1.7 | 3.3 | 3.1 | 1.2 | 28 | 1.80 | 2.1 | 1.9 | 3 | |
| **SK 35 GD 126 ET** | 40 | 35 | 1.7 | 4.6 | 4.3 | 1.05 | 34 | 1.80 | 2.9 | 1.7 | 3 | |

# Modules - IGBT - SEMITOP

| Type | IGBT | | | | | | Diode | | | | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_S$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on}$ | $E_{off}$ | $R_{th(j-s)}$ | $I_F$ @$T_S$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | $R_{th(j-s)}$ | | |
| | A | A | V | mJ | mJ | K/W | A | V | mJ | K/W | | |
| **1200 V - IGBT 4 (Trench)** | | | | | | | | | | | | |
| **SK 25 GB 12T4** | 37 | 25 | 1.85 | 2.27 | 2.7 | 1.31 | 30 | 2.40 | 1.28 | 1.91 | 2 |  |
| **SK 35 GB 12T4** | 44 | 35 | 1.85 | 3.27 | 3.3 | 1.21 | 40 | 2.30 | 1.46 | 1.55 | 2 | |
| **SK 50 GB 12T4 T** | 71 | 50 | 1.85 | 8.3 | 5 | 0.9 | 50 | 2.20 | 2.15 | 1.24 | 3 | |
| **SK 75 GB 12T4 T** | 80 | 75 | 1.85 | 13.6 | 8.2 | 0.74 | 70 | 2.10 | 3.39 | 0.97 | 3 | |
| **SK 100 GB 12T4 T** | 100 | 100 | 1.85 | 16.6 | 10 | 0.6 | 85 | 2.25 | 5.2 | 0.87 | 3 | |
| **SK 50 GH 12T4 T** | 75 | 50 | 1.8 | 8.3 | 5 | 0.65 | 56 | 2.20 | 2.15 | 1.05 | 4 |  |
| **SK 100 GH 12T4 T** | 126 | 100 | 1.8 | 16.6 | 10 | 0.43 | 102 | 2.20 | 5.2 | 0.62 | 4 | |
| **SK 50 GD 12T4 T** | 75 | 50 | 1.85 | 8.3 | 5 | 0.65 | 60 | 2.20 | 2.15 | 0.97 | 4 |  |
| **SK 75 GD 12T4 T** | 102 | 75 | 1.85 | 13.6 | 8.2 | 0.51 | 83 | 2.20 | 3.38 | 0.75 | 4 | |
| **SK 100 GD 12T4 T** | 126 | 100 | 1.85 | 16.6 | 10 | 0.43 | 102 | 2.25 | 5.2 | 0.62 | 4 | |
| **SK 10 GD 12T4 ET** | 17 | 8 | 1.85 | 0.41 | 0.76 | 2.2 | 15 | 2.38 | 0.41 | 2.7 | 3 |  |
| **SK 15 GD 12T4 ET** | 27 | 15 | 1.85 | 0.83 | 1.52 | 1.65 | 21 | 2.38 | 0.82 | 2.34 | 3 | |
| **SK 25 GD 12T4 ET** | 37 | 25 | 1.85 | 2.27 | 2.7 | 1.31 | 30 | 2.40 | 1.28 | 1.91 | 3 | |
| **SK 35 GD 12T4 ET** | 44 | 35 | 1.85 | 3.27 | 3.3 | 1.21 | 40 | 2.30 | 1.46 | 1.55 | 3 | |
| **1200 V - NPT IGBT (Standard)** | | | | | | | | | | | | |
| **SK 30 GAR 123** [1] | 33 | 25 | 2.5 | 3.5 | 2.6 | 1 | 37 | 2.00 | 1 | 1.2 | 2 |  |
| **SK 60 GAR 123** [1] | 58 | 50 | 2.5 | 9.9 | 5.3 | 0.6 | 33 | 2.00 | 0.4 | 2.1 | 2 | |
| **SK 30 GAL 123** [1] | 33 | 25 | 2.5 | 3.5 | 2.6 | 1 | 37 | 2.00 | 1 | 1.2 | 2 |  |
| **SK 60 GAL 123** [1] | 58 | 50 | 2.5 | 9.9 | 5.3 | 0.6 | 33 | 2.00 | 0.4 | 2.1 | 2 | |
| **SK 60 GM 123 USA** [1] | 60 | 50 | 2.5 | 7 | 5.2 | 0.6 | 60 | 2.00 | 2.4 | 0.7 | 2 |  |
| **SK 20 GB 123** [1] | 23 | 15 | 2.5 | 2 | 1.8 | 1.4 | 24 | 2.00 | 0.6 | 1.7 | 2 |  |
| **SK 30 GB 123** [1] | 33 | 25 | 2.5 | 3.5 | 2.6 | 1 | 37 | 2.00 | 1 | 1 | 2 | |
| **SK 40 GB 123** [1] | 40 | 30 | 2.5 | 3.2 | 3.6 | 0.85 | 48 | 2.00 | 1 | 2 | 2 | |
| **SK 60 GB 123** [1] | 58 | 50 | 2.5 | 7.6 | 5.1 | 0.6 | 57 | 2.00 | 2 | 0.9 | 3 | |
| **SK 10 GH 123** [1] | 16 | 10 | 2.7 | 1.3 | 1 | 1.8 | 18 | 2.00 | 0.4 | 2.1 | 2 |  |
| **SK 20 GH 123** [1] | 23 | 15 | 2.5 | 2 | 1.8 | 1.4 | 24 | 2.00 | 0.6 | 1.7 | 2 | |
| **SK 30 GH 123** [1] | 33 | 25 | 2.5 | 3.5 | 2.5 | 1 | 37 | 2.00 | 1 | 1.2 | 3 | |
| **SK 20 GD 123** [1] | 23 | 15 | 2.5 | 2 | 1.8 | 1.4 | 24 | 2.00 | 0.6 | 1.7 | 3 |  |
| **SK 30 GD 123** [1] | 33 | 25 | 2.5 | 3.5 | 2.5 | 1 | 24 | 2.00 | 0.6 | 1.7 | 3 | |

# Modules - IGBT - SEMITOP

| Type | IGBT | | | | | | Diode | | | | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_s$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on}$ | $E_{off}$ | $R_{th(j-s)}$ | $I_F$ @$T_s$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | $R_{th(j-s)}$ | | |
| | A | A | V | mJ | mJ | K/W | A | V | mJ | K/W | | |
| **1200 V - NPT IGBT (Ultrafast)** | | | | | | | | | | | | |
| **SK 60 GAR 125** | 51 | 50 | 3.2 | 8.36 | 3.32 | 0.6 | 43 | 2.00 | 2 | 1.16 | 2 |  |
| **SK 60 GAL 125** | 51 | 50 | 3.2 | 8.36 | 3.32 | 0.6 | 43 | 2.00 | 2 | 1.16 | 2 |  |
| **SK 60 GB 125** | 51 | 50 | 3.2 | 8.36 | 3.32 | 0.6 | 57 | - | 2 | 0.9 | 3 |  |
| **SK 80 GB 125 T** | 85 | 75 | 3.2 | 9.9 | 5 | 0.32 | 90 | 2.00 | 1 | 0.65 | 3 | |

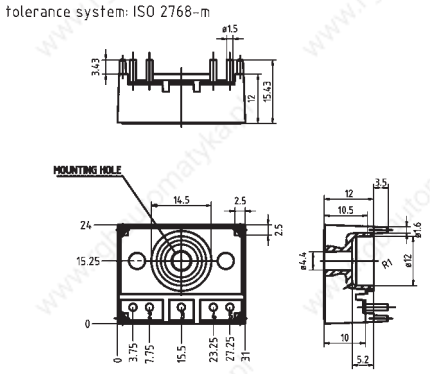
## Footnotes

1) Not for New Design

## Cases

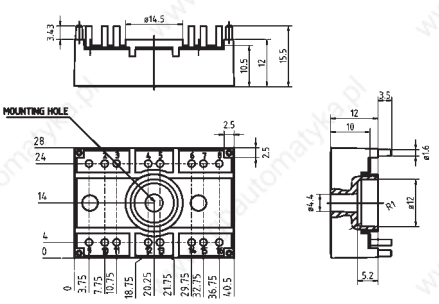
### SEMITOP 1

dimensions in mm
tolerance system: ISO 2768-m



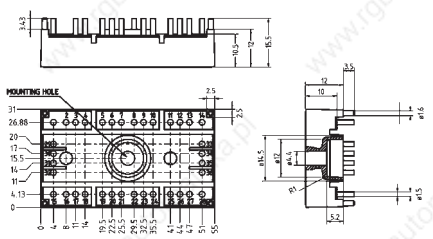

### SEMITOP 2

dimensions in mm
tolerance system: ISO 2768-m



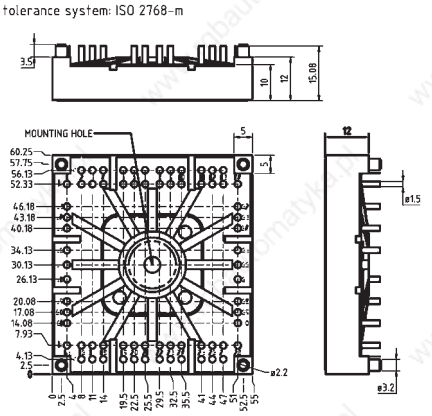

### SEMITOP 3

dimensions in mm
tolerance system: ISO 2768-m




### SEMITOP 4

dimensions in mm
tolerance system: ISO 2768-m




Dimensions in mm

# IPM Intelligent Power Modules

## MiniSKiiP® IPM

600V

CIB

1200V

6-pack

## SKiiP® 4

1200V

half bridge
1800A 3600A

1700V

half bridge
1800A 3600A

## SKiiP® 3

1200V

6-pack

1200A half bridge 2400A

6-pack

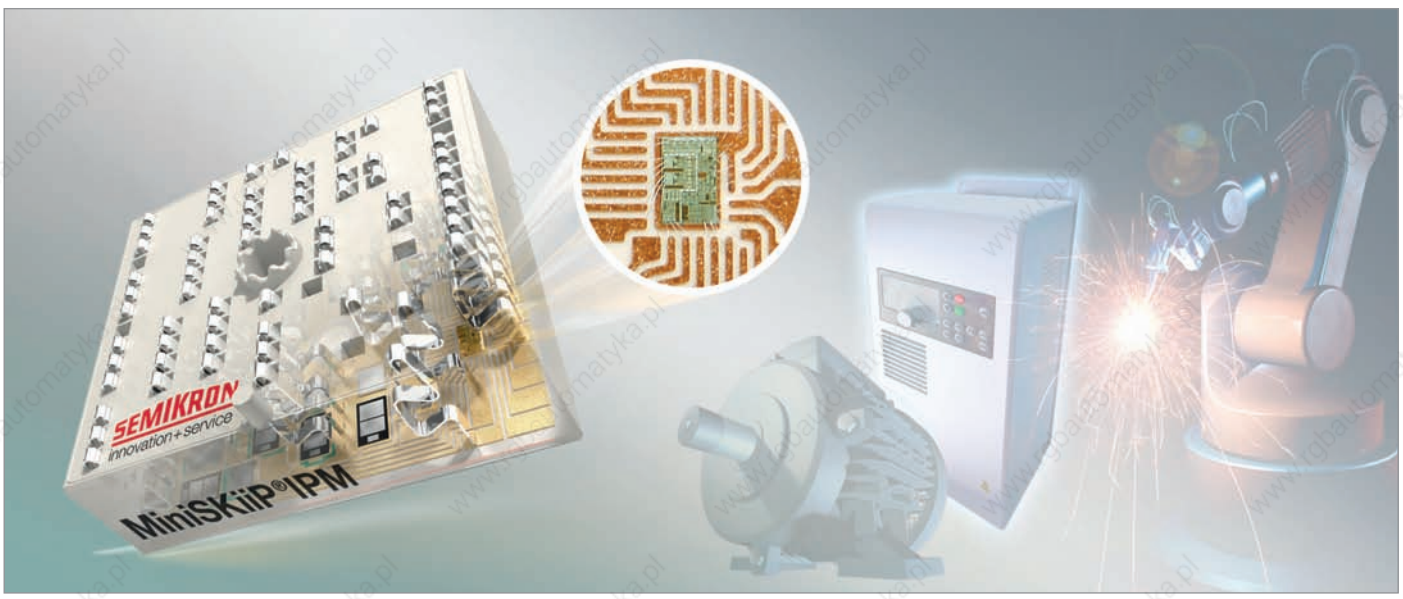
1000A half bridge 2400A

1700V

$I_c$ @ 25°C [A] 42 59 61 600 1000 1200 1800 2400 3600
$I_c$ @ 70°C SKiiP®4

# MiniSKiiP® IPM

## Compact 3-phase inverter design through high power density




### Applications

MiniSKiiP IPM is SEMIKRON's new intelligent power module family for medium power applications. Each IPM incorporates a latch-up free HVIC SOI gate driver with advanced level shifter concept. The gate driver has a 3.3 V / 5 V / 15 V compatible input signal interface and provides short-circuit current detection using external shunt resistor, integrated under-voltage lockout for all channels and interlock logic with dead time setting for cross conduction protection. A built-in temperature sensor with NTC characteristic enables monitoring of the intelligent power module temperature continuously by the external µC.

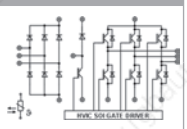
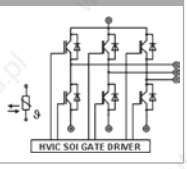
### Product range

MiniSKiiP IPM is suitable for industrial and consumer drives up to 15 kW as well as process control and solar applications. Using state-of the-art Trench-Field-Stop IGBTs, the IPMs are available in 600 V as CIB and 1200 V as 6-pack. The modules are RoHS-compliant.

### Benefits

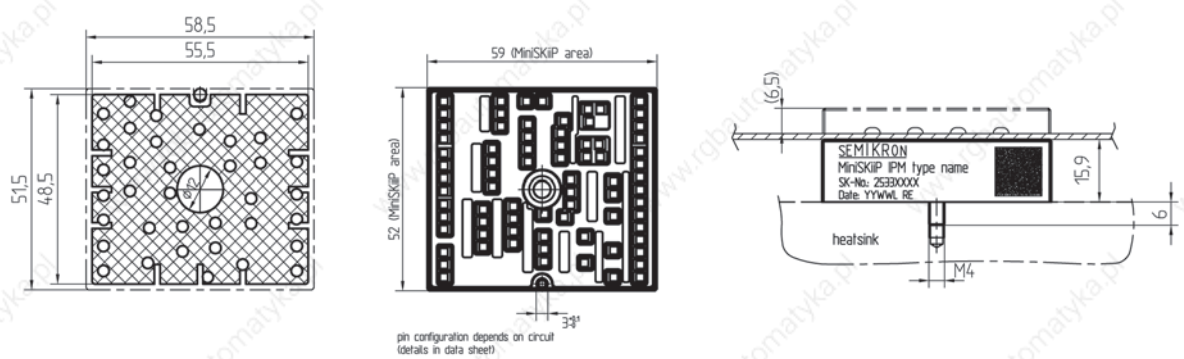
The IPM combines a base plate free package with the established pressure contact technology for quick and easy solder-free assembly. All power, control and auxiliary contacts are connected directly to the printed circuit board via springs resulting in more reliable electrical connections under stronger vibration and shock conditions. The simple one-step mounting of module, printed circuit board and heat sink with one standard screw reduces assembly steps and costs.

# Modules - IPM - MiniSKiiP

| Type | IGBT | | | | | | Diode | | | | Rectifier | | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_S$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on}$ | $E_{off}$ | $R_{th(j-s)}$ | $I_F$ @$T_S$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | $R_{th(j-s)}$ | $I_{FSM}$ @$T_S$= 25°C | $R_{th(j-s)}$ | | |
| | A | A | V | mJ | mJ | K/W | A | V | mJ | K/W | A | K/W | | |
| **600 V - IGBT 3 (Trench)** | | | | | | | | | | | | | | |
| **SKiiP 25NABI066V3** [1] | 41 | 30 | 1.5 | 1.3 | 1 | 1.4 | 37 | 1.6 | 0.6 | 1.8 | 370 | 1.7 | IPM 2 |  |
| **SKiiP 26NABI066V3** [1] | 59 | 50 | 1.45 | 3 | 2 | 1.1 | 51 | 1.5 | 1 | 1.6 | 370 | 1.7 | IPM 2 | |
| **1200 V - IGBT 4 (Trench)** | | | | | | | | | | | | | | |
| **SKiiP 25ACI12T4V2** [1] | 62 | 50 | 1.85 | 7.2 | 5.6 | 0.84 | 59 | 2.25 | 3 | 0.99 | - | - | IPM 2 |  |

## Cases

### MiniSKiiP IPM 2




**Dimensions in mm**

## Footnotes

[1] New

# Sintered chips – for high operating temperatures

## Applications

The success story of the SKiiP family has progressed hand in hand with the advancement of the wind power market. The 4th-generation SKiiP modules are a further improvement of the powerful SKiiP series. The mainstay of SKiiP4 modules is the wind power sector, with approximately 57 GW of the 122 GW of wind power installed worldwide (at the end of 2009) featuring SEMIKRON solutions, in many cases SKiiP technology. Besides wind power applications, SKiiP modules can also be found in elevators, solar power and railway applications - in fact in any area where powerful, safe and reliable IGBT IPMs are a must.

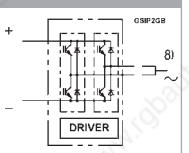
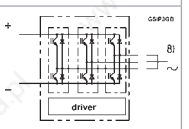
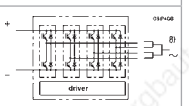
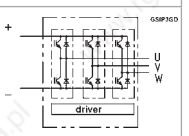
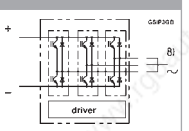
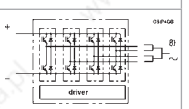
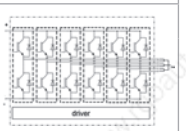
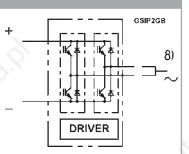
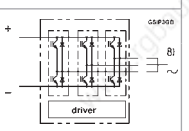
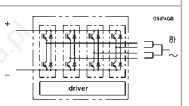
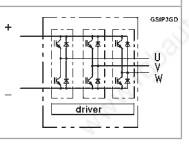
## Product range

SKiiP4 is available for 1200 V and 1700 V. In both of these voltage classes, SKiiP4 modules come in the topologies 3GB 1800 A, 4GB 2400 A and - new to the SKiiP family - 6GB 3600 A.

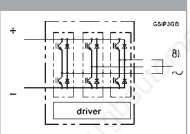
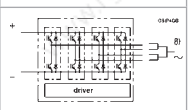
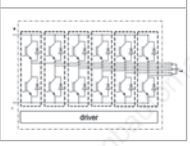
## Benefits

SKiiP4 is the most powerful IPM on the market. SKiiP4 modules enable the production of converter units with outputs of up to 2.1 MW. The power semiconductors used in SKiiP4 modules can be operated at a junction temperature of up to 175°C. To make sure these components can be reliably used at these temperatures, the power circuitry is 100% solder-free. Instead, sinter technology is used to create a sintered silver layer in place of the solder layer that can limit the service life of power modules. Reliability during active and passive thermal cycling is greatly improved. A further benefit is the better load cycling capability as compared with solder-based modules. The integrated gate driver in the SKiiP4 sets new standards on the reliability and functionality fronts. The digital driver guarantees safe isolation between the primary and secondary side for both switching signals and all measurement parameters, such as temperature and DC link voltage. This means the user no longer has to introduce complex and costly circuit components to provide safe isolation. For the first time, the SKiiP driver features a CANopen diagnosis channel for the integration of additional functions.

# Modules - IPM - SKiiP 3 / 4

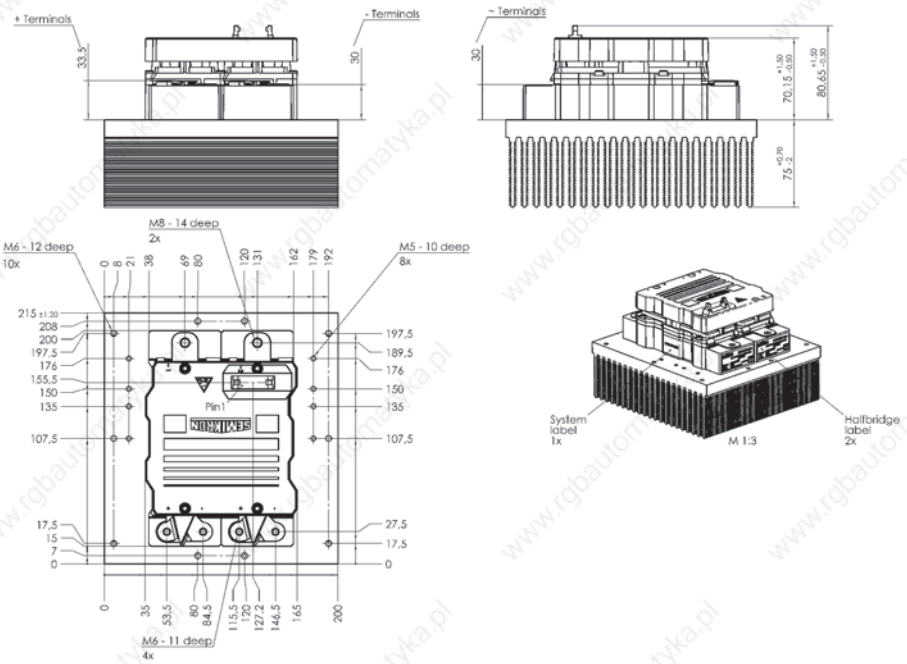
| Type | IGBT | | | | Diode | | | Case | | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_S$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on} + E_{off}$ | $I_F$ @$T_S$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | Case | Options | |
| | A | A | V | mJ | A | V | mJ | | | |
| **1200 V - IGBT 3 (Trench) - SKiiP 3** | | | | | | | | | | |
| **SKiiP 1213 GB123-2DL V3** | 1200 | 1200 | 1.7 | 390 | 930 | 1.50 | 56 | S23 | W,L,F |  |
| **SKiiP 1813 GB123-3DL V3** | 1800 | 1800 | 1.7 | 585 | 1410 | 1.50 | 84 | S33 | W,L,F,U |  |
| **SKiiP 2413 GB123-4DL V3** | 2400 | 2400 | 1.7 | 780 | 1860 | 1.50 | 112 | S43 | W,L,F,U |  |
| **SKiiP 613 GD123-3DUL V3** | 600 | 600 | 1.7 | 195 | 470 | 1.50 | 28 | S33 | L,W |  |
| **1200 V - IGBT 4 (Trench) - SKiiP 4** | | | | | | | | | | |
| **SKiiP 1814 GB12E4-3DUL** | 2345 | 1800 | 2.01 | 1260 | 1776 | 2.33 | 150 | S34 | F,S |  |
| **SKiiP 1814 GB12E4-3DUW** | 2345 | 1800 | 2.01 | 1260 | 1776 | 2.33 | 150 | S34 | F,S | |
| **SKiiP 2414 GB12E4-4DUL** | 3109 | 2400 | 2.01 | 1680 | 2369 | 2.33 | 200 | S44 | F,S |  |
| **SKiiP 2414 GB12E4-4DUW** | 3109 | 2400 | 2.01 | 1680 | 2369 | 2.33 | 200 | S44 | F,S | |
| **SKiiP 3614 GB12E4-6DUL** | 4664 | 3600 | 2.01 | 2520 | 3558 | 2.33 | 300 | S64 | F,S |  |
| **SKiiP 3614 GB12E4-6DUW** | 4664 | 3600 | 2.01 | 2520 | 3558 | 2.33 | 300 | S64 | F,S | |
| **1700 V - IGBT 3 (Trench) - SKiiP 3** | | | | | | | | | | |
| **SKiiP 1013 GB172-2DL V3** | 1000 | 1000 | 1.9 | 575 | 830 | 2.00 | 86 | S23 | W,L,F |  |
| **SKiiP 1203 GB172-2DW V3** | 1200 | 1200 | 1.9 | 575 | 900 | 2.00 | 86 | S23 | W,L,F | |
| **SKiiP 1513 GB172-3DL V3** | 1500 | 1500 | 1.9 | 863 | 1250 | 2.00 | 128 | S33 | W,L,F,U |  |
| **SKiiP 1803 GB172-3DW V3** | 1800 | 1800 | 1.9 | 863 | 1400 | 2.00 | 128 | S33 | W,L,F | |
| **SKiiP 2013 GB172-4DL V3** | 2000 | 2000 | 1.9 | 1150 | 1650 | 2.00 | 171 | S43 | W,L,F,U |  |
| **SKiiP 2403 GB172-4DW V3** | 2400 | 2400 | 1.9 | 1150 | 1800 | 2.00 | 171 | S43 | W,L,F,U | |
| **SKiiP 513 GD172-3DUL V3** | 500 | 500 | 1.9 | 288 | 400 | 1.90 | 43 | S33 | W,L |  |
| **SKiiP 603 GD172-3DUW V3** | 570 | 600 | 1.9 | 288 | 450 | 1.90 | 43 | S33 | W,L | |

# Modules - IPM - SKiiP 3 / 4

| Type | IGBT | | | | Diode | | | Case | | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_S$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on} + E_{off}$ | $I_F$ @$T_S$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | Case | Options | |
| | A | A | V | mJ | A | V | mJ | | | |
| **1700 V - IGBT 4 (Trench) - SKiiP 4** | | | | | | | | | | |
| **SKiiP 1814 GB17E4-3DUL** | 2547 | 1800 | 2.12 | 2130 | 1771 | 2.02 | 342 | S34 | F,S |  |
| **SKiiP 1814 GB17E4-3DUW** | 2547 | 1800 | 2.12 | 2130 | 1771 | 2.02 | 342 | S34 | F,S | |
| **SKiiP 2414 GB17E4-4DUL** | 3385 | 2400 | 2.12 | 2840 | 2362 | 2.02 | 456 | S44 | F,S |  |
| **SKiiP 2414 GB17E4-4DUW** | 3385 | 2400 | 2.12 | 2840 | 2362 | 2.02 | 456 | S44 | F,S | |
| **SKiiP 3614 GB17E4-6DUL** | 5078 | 3600 | 2.12 | 6840 | 3547 | 2.02 | 684 | S64 | F,S |  |
| **SKiiP 3614 GB17E4-6DUW** | 5078 | 3600 | 2.12 | 6840 | 3547 | 2.02 | 684 | S64 | F,S | |

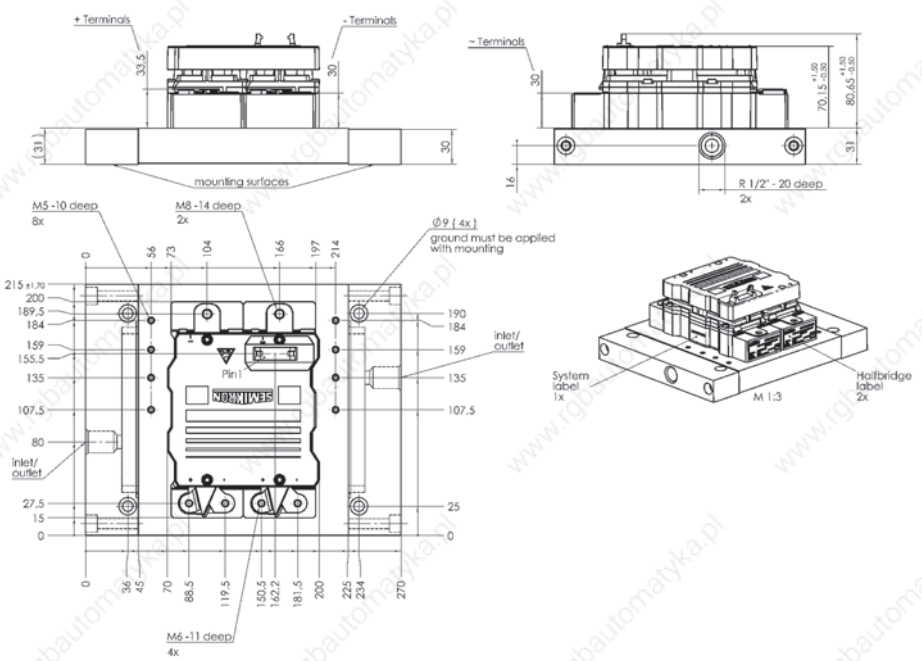
## Cases SKiiP 3

### Case S 23 mounted on P3016 heat sink




| | |
|---|---|
| **weight without heat sink:** | **1,7 kg** |
| **P3016:** | **4,4 kg** |

### Case S 23 mounted on liquid cooled heat sink NWK 40

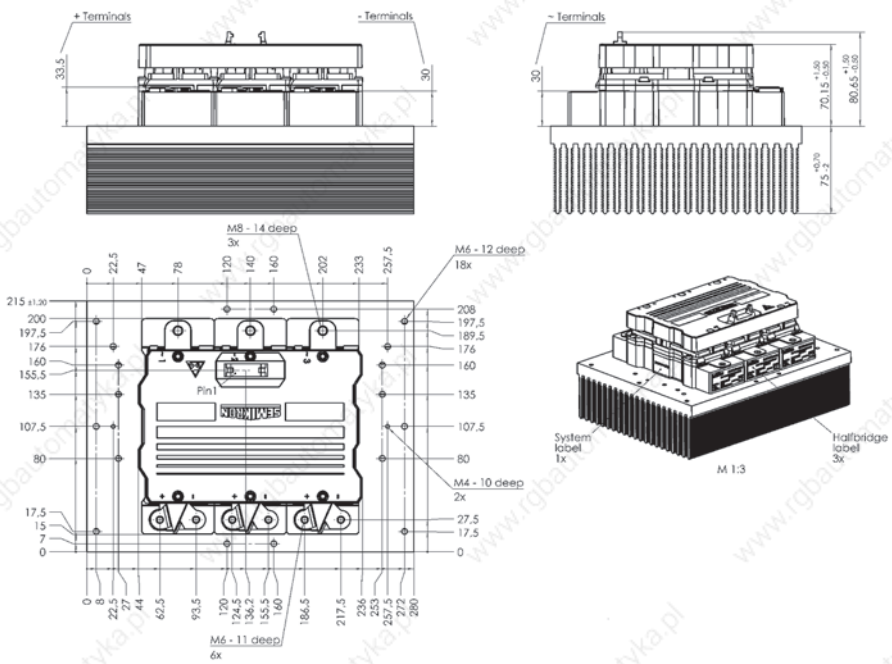



| | |
|---|---|
| **NWK 40:** | **2,8 kg** |

**Dimensions in mm**

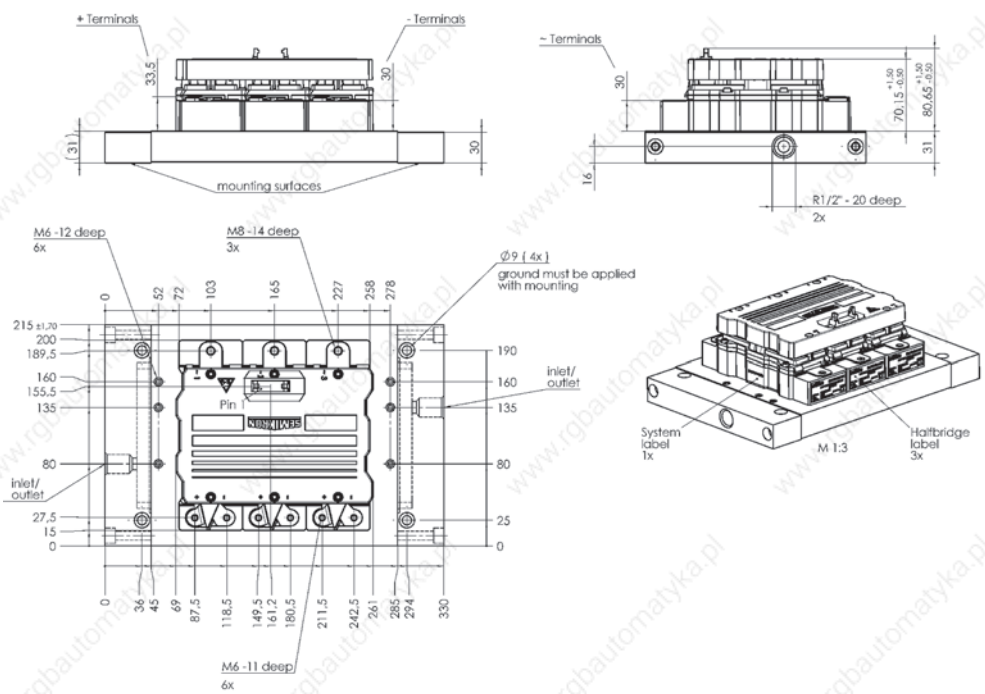
## Cases SKiiP 3

### Case S 33 mounted on P3016 heat sink




| | |
|---|---|
| **weight without heat sink:** | **2,4 kg** |
| **P3016:** | **6,2 kg** |

### Case S 33 mounted on liquid cooled heat sink NWK 40



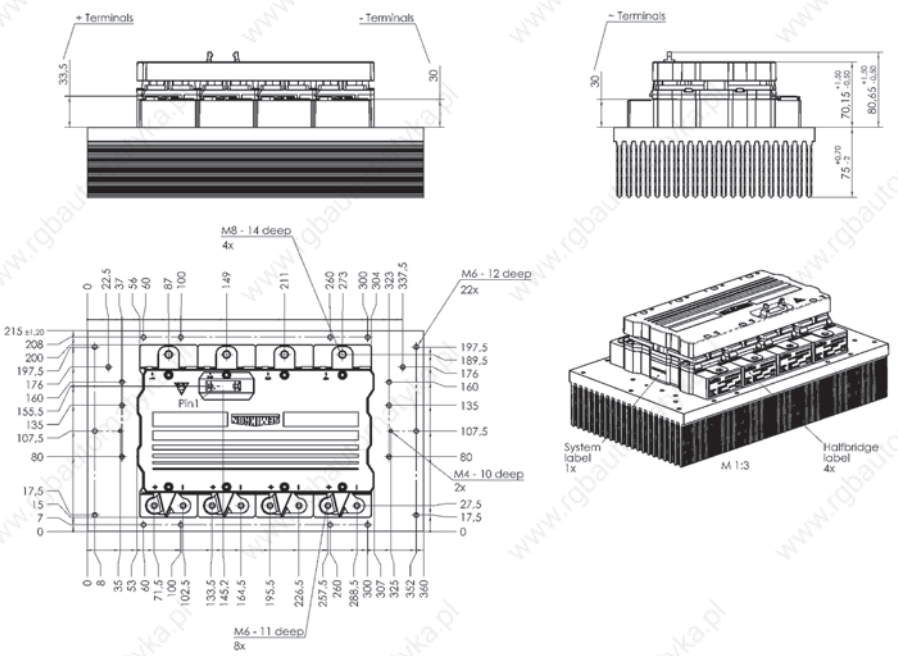

| | |
|---|---|
| **NWK 40:** | **5,2 kg** |

**Dimensions in mm**

# Modules - IPM - SKiiP 3 / 4

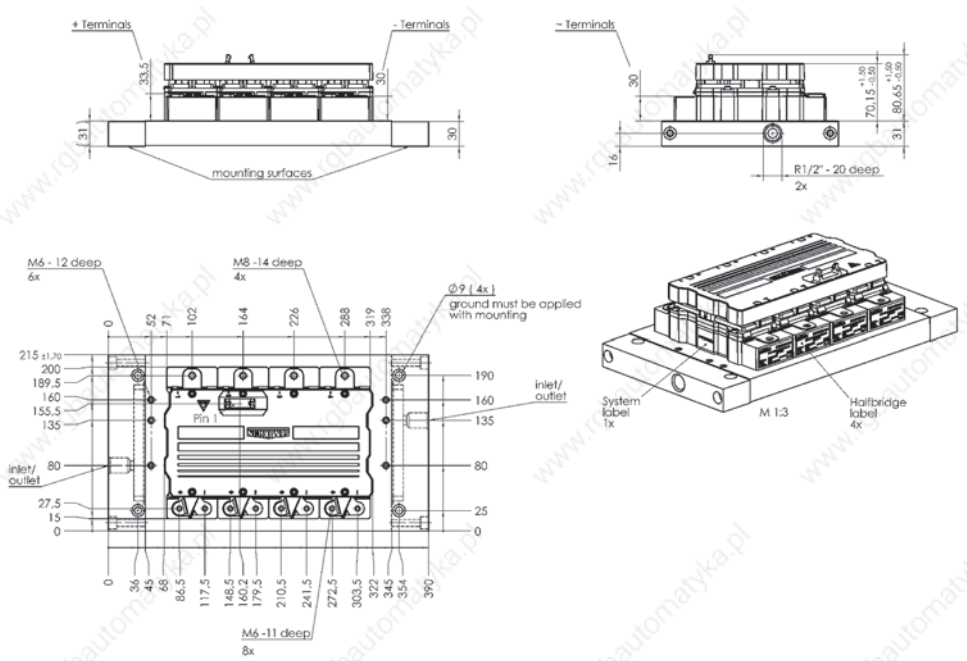
## Cases SKiiP 3

### Case S 43 mounted on P3016 heat sink




| | |
|---|---|
| **weight without heat sink:** | **3,1 kg** |
| **P3016:** | **8,0 kg** |

### Case S 43 mounted on liquid cooled heat sink NWK 40

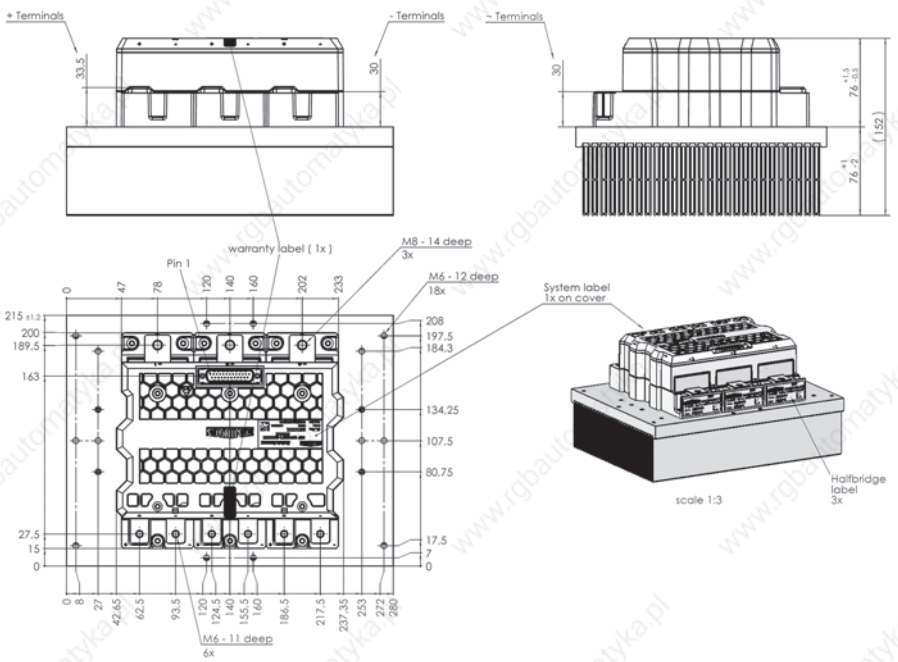



| | |
|---|---|
| **NWK 40:** | **6,2 kg** |

**Dimensions in mm**

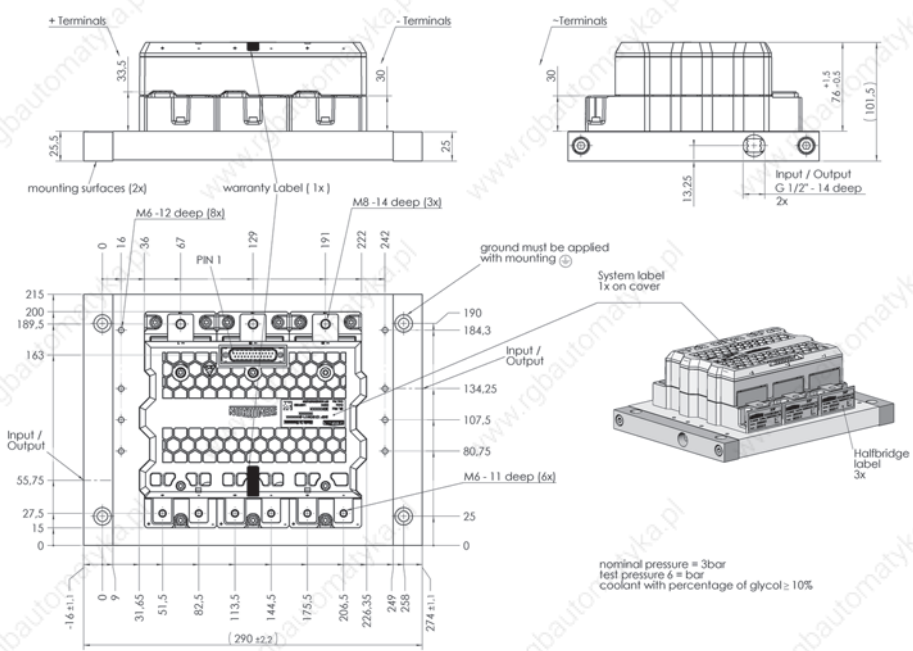
## Cases SKiiP 4

### Case S 34 mounted on P4016 heat sink




| | |
|---|---|
| **weight without heat sink:** | **2,48 kg** |
| **P4016:** | **5,9 kg** |

### Case S 34 mounted on liquid cooled heat sink NHC

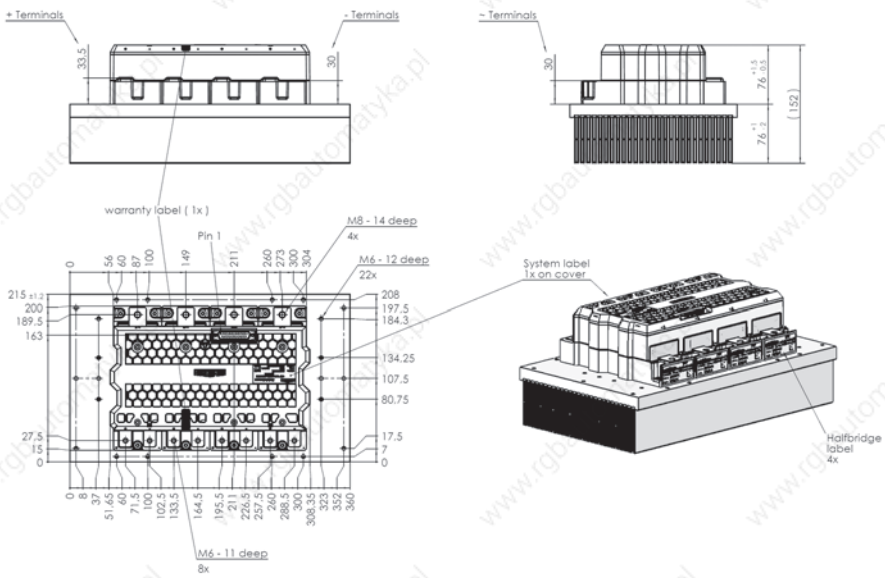



| | |
|---|---|
| **NHC:** | **3,49 kg** |

**Dimensions in mm**

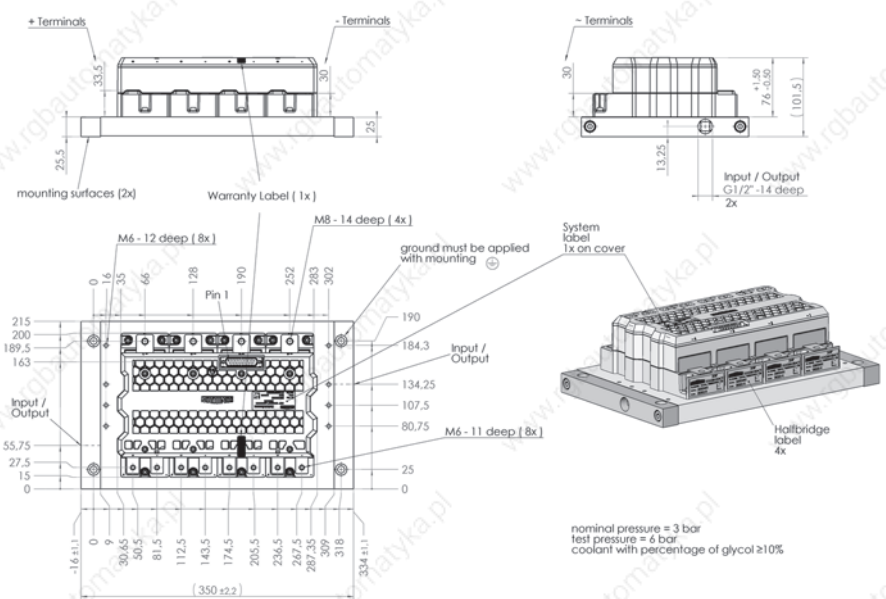
## Cases SKiiP 4

### Case S 44 mounted on P4016 heat sink




| | |
|---|---|
| **weight without heat sink:** | **3,22 kg** |
| **P4016:** | **7,55 kg** |

### Case S 44 mounted on liquid cooled heat sink NHC

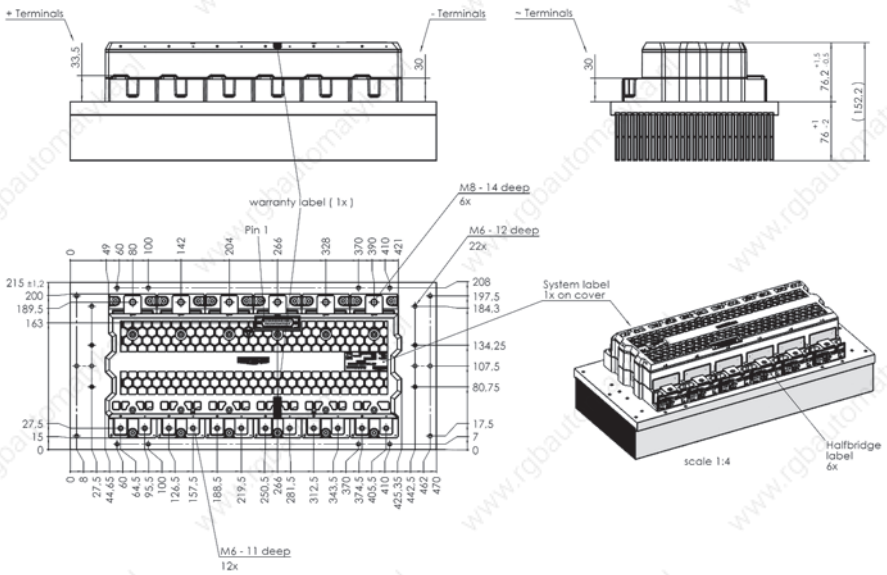



| | |
|---|---|
| **NHC:** | **4,25 kg** |

**Dimensions in mm**

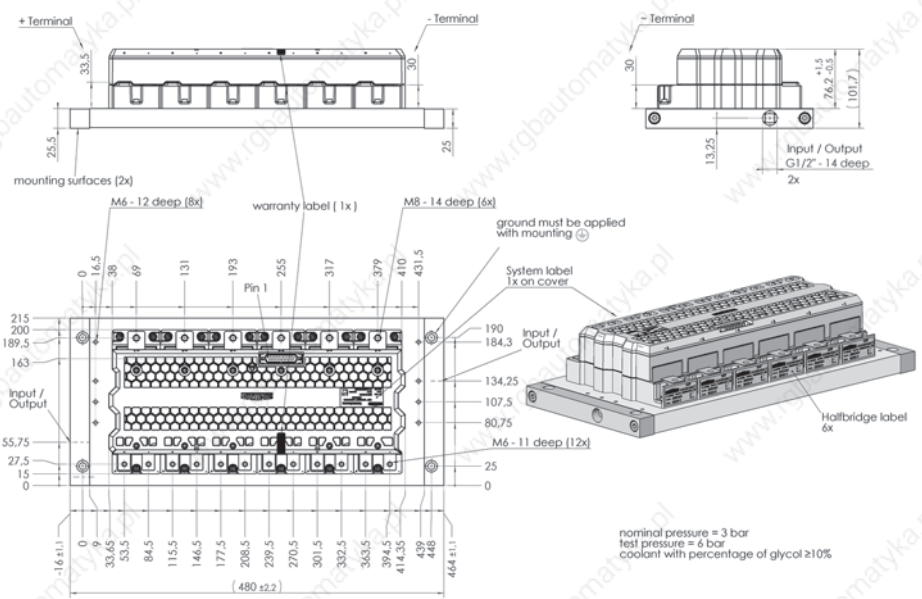
## Cases SKiiP 4

### Case S 64 mounted on P4016 heat sink




| | |
|---|---|
| **weight without heat sink:** | **4,84 kg** |
| **P4016:** | **9,9 kg** |

### Case S 64 mounted on liquid cooled heat sink NHC

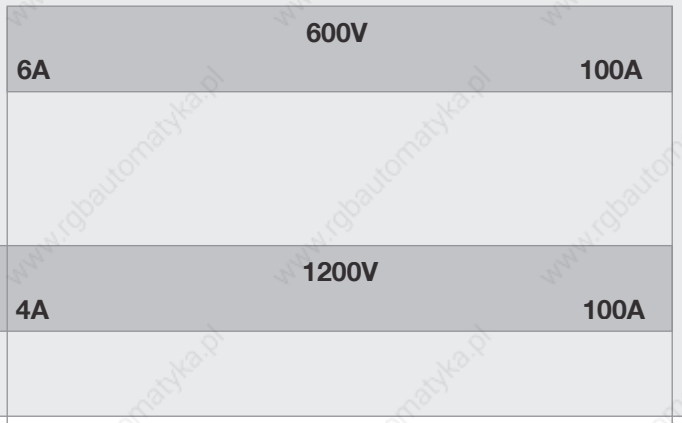



| | |
|---|---|
| **NHC:** | **5,77 kg** |

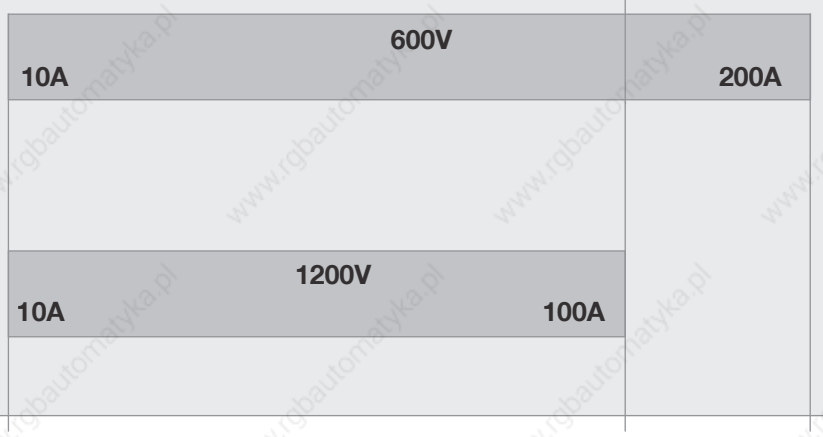
**Dimensions in mm**

# CIB Converter Inverter Brake Modules

## MiniSKiiP®

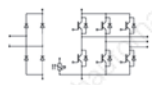
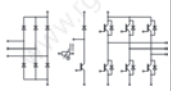
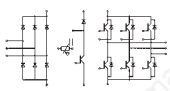
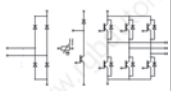
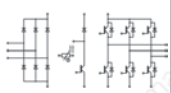
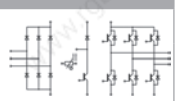
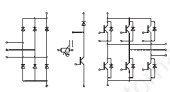
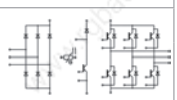
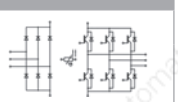
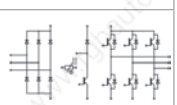
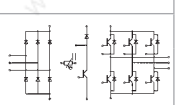
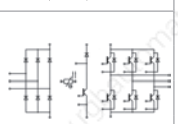



## SEMITOP®




$I_{Cnom}$ [A] 4 6 10 100 200

# Modules - CIB - MiniSKiiP

| Type | IGBT | | | | | | Diode | | | | Rectifier | | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_S$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on}$ | $E_{off}$ | $R_{th(j-s)}$ | $I_F$ @$T_S$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | $R_{th(j-s)}$ | $I_{FSM}$ @$T_S$= 25°C | $R_{th(j-s)}$ | | |
| | A | A | V | mJ | mJ | K/W | A | V | mJ | K/W | A | K/W | | |
| **600 V - IGBT 3 (Trench)** | | | | | | | | | | | | | | |
| **SKiiP 01NEC066V3** | 12 | 6 | 1.45 | 0.3 | 0.2 | 2.4 | 12 | 1.30 | 0.2 | 3 | 220 | 1.5 | II 0 |  |
| **SKiiP 02NEC066V3** | 20 | 10 | 1.45 | 0.5 | 0.3 | 2 | 20 | 1.30 | 0.5 | 2.5 | 220 | 1.5 | II 0 | |
| **SKiiP 03NEC066V3** | 27 | 15 | 1.45 | 0.6 | 0.5 | 1.8 | 28 | 1.40 | 0.5 | 2.5 | 220 | 1.5 | II 0 | |
| **SKiiP 12NAB066V1** | 20 | 10 | 1.45 | 0.5 | 0.3 | 2 | 20 | 1.30 | 0.5 | 2.5 | 220 | 1.5 | II 1 |  |
| **SKiiP 13NAB066V1** | 27 | 15 | 1.45 | 0.6 | 0.5 | 1.8 | 28 | 1.40 | 0.5 | 2.5 | 220 | 1.5 | II 1 | |
| **SKiiP 14NAB066V1** | 33 | 20 | 1.45 | 0.75 | 0.7 | 1.6 | 31 | 1.60 | 0.55 | 2.5 | 220 | 1.5 | II 1 | |
| **SKiiP 25NAB066V1** | 43 | 30 | 1.45 | 0.9 | 1.2 | 1.35 | 39 | 1.50 | 1.1 | 2.1 | 370 | 1.5 | II 2 |  |
| **SKiiP 26NAB066V1** | 65 | 50 | 1.45 | 1.6 | 1.6 | 0.95 | 56 | 1.50 | 1.3 | 1.6 | 370 | 1.5 | II 2 | |
| **SKiiP 25NEB066V1** | 43 | 30 | 1.45 | 0.9 | 1.2 | 1.35 | 39 | 1.50 | 1.1 | 2.1 | 370 | 1.5 | II 2 |  |
| **600 V - NPT IGBT (Ultrafast)** | | | | | | | | | | | | | | |
| **SKiiP 11NAB065V1** [1] | 12 | 6 | 2 | 0.3 | 0.2 | 1.9 | 12 | 1.30 | 0.2 | 2.5 | 220 | 1.5 | II 1 |  |
| **SKiiP 12NAB065V1** [1] | 20 | 10 | 2 | 0.3 | 0.3 | 1.5 | 20 | 1.40 | 0.2 | 2.5 | 220 | 1.5 | II 1 | |
| **SKiiP 13NAB065V1** [1] | 24 | 15 | 2 | 0.6 | 0.3 | 1.4 | 26 | 1.40 | 0.4 | 2.2 | 220 | 1.5 | II 1 | |
| **SKiiP 14NAB065V1** [1] | 29 | 20 | 2 | 0.7 | 0.4 | 1.25 | 26 | 1.60 | 0.4 | 2.2 | 370 | 1.25 | II 1 | |
| **1200 V - IGBT 3 (Trench)** | | | | | | | | | | | | | | |
| **SKiiP 11NAB126V1** [1] | 16 | 8 | 1.7 | 0.8 | 1 | 1.5 | 14 | 1.90 | 0.9 | 2.5 | 220 | 1.5 | II 1 |  |
| **SKiiP 12NAB126V1** [1] | 28 | 15 | 1.7 | 2 | 1.9 | 1.15 | 26 | 1.60 | 1.3 | 1.95 | 220 | 1.5 | II 1 | |
| **SKiiP 23NAB126V1** [1] | 41 | 25 | 1.7 | 3.5 | 3 | 0.9 | 30 | 1.80 | 2.5 | 1.7 | 370 | 1.25 | II 2 |  |
| **SKiiP 23NAB126V10** [1] | 41 | 25 | 1.7 | 3.5 | 3 | 0.9 | 30 | 1.80 | 2.5 | 1.7 | 635 | 0.9 | II 2 | |
| **SKiiP 24NAB126V1** [1] | 52 | 35 | 1.7 | 4.6 | 4 | 0.75 | 38 | 1.80 | 3.3 | 1.5 | 370 | 1.25 | II 2 | |
| **SKiiP 24NAB126V10** [1] | 52 | 35 | 1.7 | 4.6 | 4 | 0.75 | 38 | 1.80 | 3.3 | 1.5 | 635 | 0.9 | II 2 | |
| **SKiiP 35NAB126V1** [1] | 73 | 50 | 1.7 | 6.5 | 6.1 | 0.55 | 62 | 1.60 | 4.7 | 1 | 700 | 0.9 | II 3 |  |
| **SKiiP 36NAB126V1** [1] | 88 | 70 | 1.7 | 9 | 7.7 | 0.5 | 91 | 1.50 | 7.5 | 0.7 | 700 | 0.9 | II 3 | |
| **1200 V - IGBT 4 (Trench)** | | | | | | | | | | | | | | |
| **SKiiP 02NAC12T4V1** | 6 | 4 | 1.85 | 0.66 | 0.37 | 2.49 | 7.5 | 1.8 | 0.34 | 2.53 | 220 | 1.5 | II 0 |  |
| **SKiiP 03NAC12T4V1** | 7.5 | 8 | 1.85 | 0.9 | 0.7 | 1.84 | 9 | 2.3 | 0.5 | 2.53 | 220 | 1.5 | II 0 | |
| **SKiiP 10NAB12T4V1** | 6 | 4 | 1.85 | 0.66 | 0.37 | 2.49 | 7.5 | 1.8 | 0.34 | 2.53 | 220 | 1.5 | II 1 |  |
| **SKiiP 11NAB12T4V1** | 12 | 8 | 1.85 | 0.87 | 0.74 | 1.84 | 15 | 2.3 | 0.57 | 2.53 | 220 | 1.5 | II 1 | |
| **SKiiP 12NAB12T4V1** | 18 | 15 | 1.85 | 1.4 | 1.3 | 1.3 | 23 | 2.40 | 1.1 | 1.92 | 220 | 1.5 | II 1 | |
| **SKiiP 23NAB12T4V1** | 37 | 25 | 1.85 | 2.65 | 2.3 | 1.2 | 32 | 2.40 | 1.6 | 1.52 | 370 | 1.25 | II 2 |  |
| **SKiiP 24NAB12T4V1** | 48 | 35 | 1.85 | 4.3 | 3.25 | 1 | 44 | 2.3 | 2.4 | 1.2 | 370 | 1.25 | II 2 | |
| **SKiiP 34NAB12T4V1** | 52 | 35 | 1.85 | 4.3 | 3.3 | 0.85 | 44 | 2.3 | 2.4 | 1.2 | 370 | 1.25 | II 3 |  |
| **SKiiP 35NAB12T4V1** | 69 | 50 | 1.85 | 6 | 4.7 | 0.71 | 60 | 2.25 | 3.4 | 0.95 | 700 | 0.9 | II 3 | |
| **SKiiP 37NAB12T4V1** | 90 | 75 | 1.85 | 9.7 | 6.8 | 0.58 | 83 | 2.2 | 4.9 | 0.75 | 700 | 0.9 | II 3 | |
| **SKiiP 38NAB12T4V1** | 115 | 100 | 1.8 | 11.2 | 10 | 0.48 | 99 | 2.2 | 6.5 | 0.66 | 1000 | 0.7 | II 3 | |

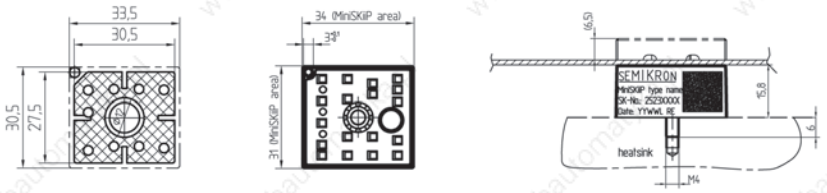
**Footnotes**

[1] Not for New Design

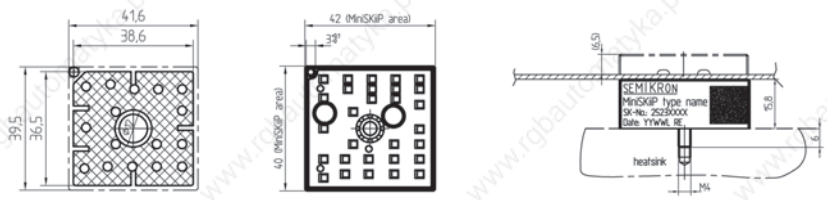
# Modules - CIB - MiniSKiiP

## Cases

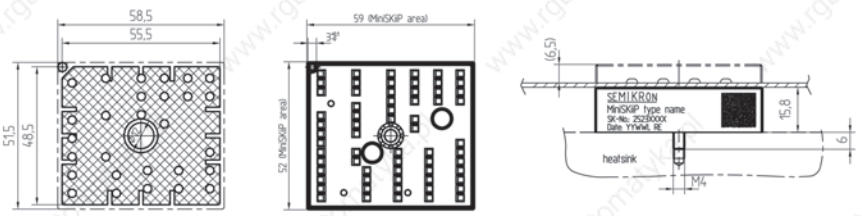
### MiniSKiiP II 0



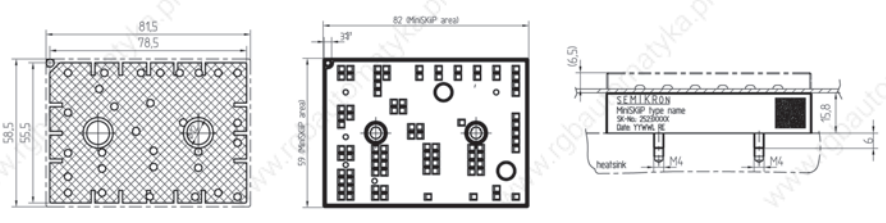

### MiniSKiiP II 1




### MiniSKiiP II 2

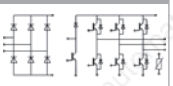
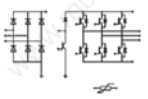
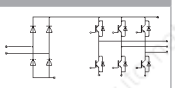
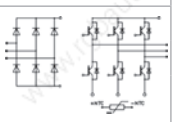
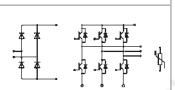
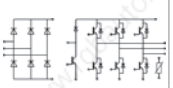
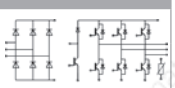
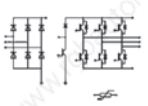
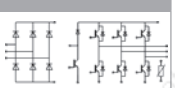
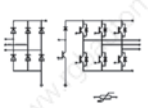



### MiniSKiiP II 3




**Dimensions in mm**

# Modules - CIB - SEMITOP

| Type | IGBT | | | | | | Diode | | | | Rectifier | | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_S$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on}$ | $E_{off}$ | $R_{th(j-s)}$ | $I_F$ @$T_S$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | $R_{th(j-s)}$ | $I_{FSM}$ @$T_S$= 25°C | $R_{th(j-s)}$ | | |
| | A | A | V | mJ | mJ | K/W | A | V | mJ | K/W | A | K/W | | |
| **600 V - IGBT 3 (Trench)** | | | | | | | | | | | | | | |
| **SK 20 DGDL 066 ET** | 30 | 20 | 1.45 | 0.3 | 0.6 | 1.95 | 27 | 1.40 | 0.2 | 2.46 | 220 | 2.15 | 3 |  |
| **SK 30 DGDL 066 ET** | 40 | 30 | 1.45 | 0.55 | 1.15 | 1.65 | 36 | 1.50 | 0.53 | 2.3 | 370 | 1.7 | 3 | |
| **SK 50 DGDL 066 T** | 69 | 50 | 1.45 | 2.2 | 1.74 | 0.95 | 54 | 1.35 | 0.73 | 1.6 | 370 | 1.5 | 4 |  |
| **SK 75 DGDL 066 T** | 81 | 75 | 1.45 | 3.1 | 2.8 | 0.75 | 64 | 1.35 | 0.9 | 1.2 | 700 | 0.9 | 4 | |
| **SK 100 DGDL 066 T** | 106 | 100 | 1.45 | 4.4 | 3.5 | 0.65 | 99 | 1.10 | 1.45 | 0.8 | 700 | 0.9 | 4 | |
| **600 V - NPT IGBT (Ultrafast)** | | | | | | | | | | | | | | |
| **SK 8 BGD 065 E** [1] | 12 | 6 | 2 | 0.22 | 0.12 | 2.6 | 13 | 1.35 | - | 2.7 | 220 | 2.15 | 2 |  |
| **SK 9 DGD 065 ET** | 12 | 6 | 2 | 0.22 | 0.12 | 2.6 | 20 | 1.35 | 0.31 | 2.7 | 220 | 2.15 | 3 |  |
| **SK 20 DGD 065 ET** | 26 | 20 | 2 | 0.66 | 0.4 | 1.7 | 25 | 1.60 | - | 1.7 | 370 | 1.7 | 3 | |
| **SK 25 DGD 065 ET** [1] | 30 | 20 | 1.8 | 0.8 | 0.55 | 1.4 | 36 | 1.45 | - | 1.7 | 370 | 1.7 | 3 | |
| **SK 9 BGD 065 ET** | 12 | 6 | 2 | 0.22 | 0.12 | 2.6 | 20 | 1.35 | 0.31 | 2.7 | 220 | 2.15 | 3 |  |
| **SK 10 BGD 065 ET** | 17 | 6 | 2 | 0.18 | 0.13 | 2 | 22 | 1.30 | 0.18 | 2.3 | 220 | 2.7 | 3 | |
| **SK 8 DGDL 065 ET** [1] | 12 | 6 | 2 | 0.22 | 0.12 | 2.6 | 13 | 1.35 | - | 2.7 | - | 2.8 | 3 |  |
| **SK 10 DGDL 065 ET** | 17 | 6 | 2 | 0.18 | 0.13 | 2 | 22 | 1.30 | 0.18 | 2.3 | 220 | 2.7 | 3 | |
| **SK 15 DGDL 065 ET** [1] | 19 | 10 | 2 | 0.3 | 0.22 | 1.9 | 22 | 1.40 | 0.24 | 2.3 | 220 | 2.7 | 3 | |
| **SK 20 DGDL 065 ET** | 24 | 20 | 2 | 0.69 | 0.39 | 1.7 | 25 | 1.60 | - | 1.7 | 220 | 2 | 3 | |
| **1200 V - IGBT 3 (Trench)** | | | | | | | | | | | | | | |
| **SK 10 DGDL 126 ET** | 15 | 8 | 1.7 | 1 | 1 | 2 | 25 | 1.90 | 1.4 | 2.1 | 220 | 2.7 | 3 |  |
| **SK 15 DGDL 126 ET** | 22 | 15 | 1.7 | 2 | 1.8 | 1.6 | 25 | 1.60 | 1.1 | 2.1 | 220 | 2 | 3 | |
| **SK 25 DGDL 126 T** | 41 | 25 | 1.7 | 2.8 | 3.1 | 0.9 | 30 | 1.50 | 2 | 1.7 | 370 | 1.5 | 4 |  |
| **SK 35 DGDL 126 T** | 52 | 35 | 1.7 | 3.7 | 4.8 | 0.75 | 38 | 1.50 | 3 | 1.5 | 370 | 1.25 | 4 | |
| **SK 50 DGDL 126 T** | 68 | 50 | 1.7 | 4.6 | 6.3 | 0.6 | 62 | 1.35 | 3.6 | 1 | 700 | 0.9 | 4 | |
| **1200 V - IGBT 4 (Trench)** | | | | | | | | | | | | | | |
| **SK 10 DGDL 12T4 ET** | 17 | 8 | 1.85 | 0.41 | 0.75 | 2.2 | 15 | 2.38 | 0.41 | 2.7 | 220 | 2 | 3 |  |
| **SK 15 DGDL 12T4 ET** | 27 | 15 | 1.85 | 0.82 | 1.52 | 1.65 | 21 | 2.38 | 0.82 | 2.34 | 220 | 2 | 3 | |
| **SK 25 DGDL 12T4 T** | 45 | 25 | 1.85 | 2.27 | 2.7 | 0.96 | 30 | 2.40 | - | 1.7 | 370 | 1.25 | 4 |  |
| **SK 35 DGDL 12T4 T** | 58 | 35 | 1.85 | 3.27 | 3.3 | 0.8 | 46 | 2.30 | 1.46 | 1.37 | 370 | 1.25 | 4 | |
| **SK 50 DGDL 12T4 T** | 75 | 50 | 1.85 | 8.3 | 5 | 0.65 | 60 | 2.22 | 2.15 | 0.97 | 700 | 0.9 | 4 | |

**For detailed case drawings please see page 23**

## Footnotes

[1] Not for New Design

# MOSFET Modules

## SEMITRANS®

single switch

100V/200V
130A 200A

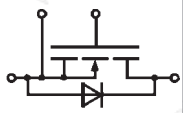
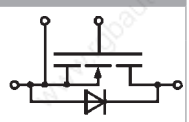
## SEMITOP®

6-pack
H-bridge
Half bridge

55V, 75V, 100V
80A 290A

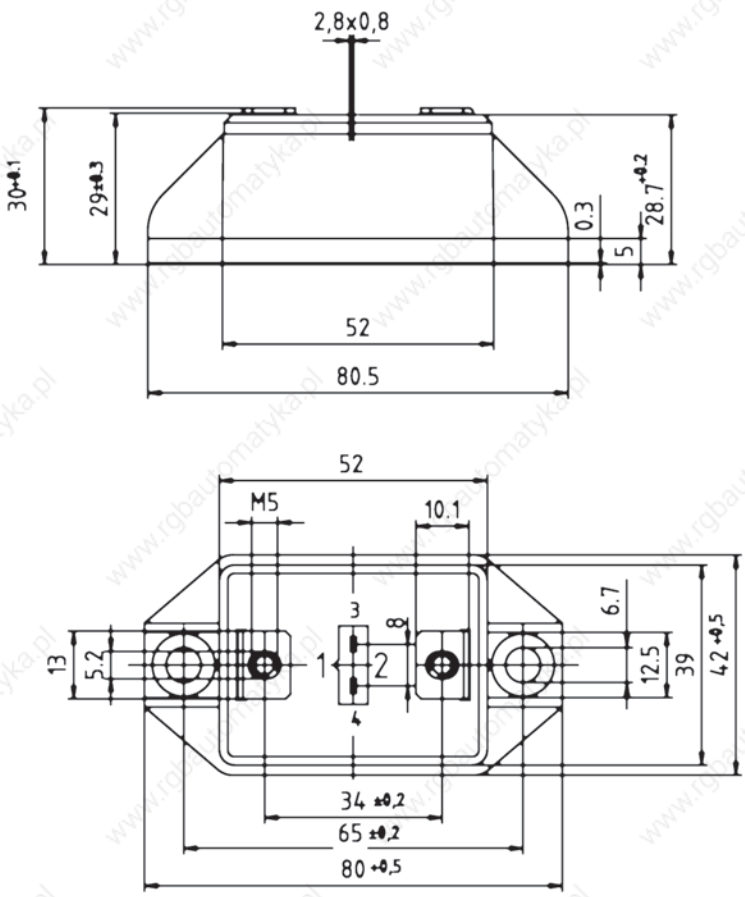
$I_D$@ 25°C [A] 80 130 200 290

# Modules - MOSFET - SEMITRANS

| Type | $V_{DS}$ V | $I_D$ @$T_C$= 25°C A | $R_{DS(on)}$ @$T_j$= 25°C typ. mΩ | $R_{th(j-c)}$ K/W | Case | Circuit |
|---|---|---|---|---|---|---|
| **100 V** | | | | | | |
| **SKM 111 AR** | 100 | 200 | 7 | 0.18 | M1 |  |
| **200 V** | | | | | | |
| **SKM 121 AR** [1] | 200 | 130 | 18 | 0.18 | M1 |  |
| **SKM 180 A020** | 200 | 180 | 9 | 0.18 | M1 | |

## Cases

**SEMITRANS M1**

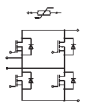
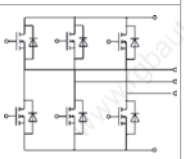
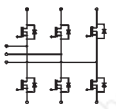
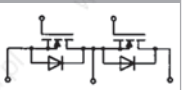
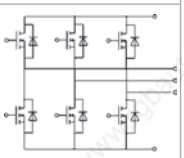
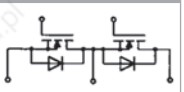
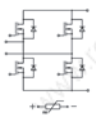
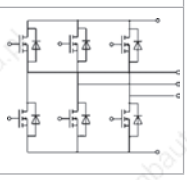



**Dimensions in mm**

### Footnotes

[1] Not for New Design

# Modules - MOSFET - SEMITOP

| Type | $V_{DS}$ V | $I_D$ @$T_C$= 25°C A | $R_{DS(on)}$ @$T_j$= 25°C typ. mΩ | $R_{th(j-s)}$ K/W | Case | Circuit |
|---|---|---|---|---|---|---|
| **55 V** | | | | | | |
| **SK 150 MHK 055 T** [1] | 55 | 240 | 1.1 | 0.8 | 3 |  |
| **SK 80 MD 055** [1] | 55 | 117 | 2.2 | 1.1 | 2 |  |
| **SK 80 MBBB 055** | 55 | 117 | 2.2 | 1.1 | 3 |  |
| **75 V** | | | | | | |
| **SK 300 MB 075** | 75 | 290 | - | 0.45 | 3 |  |
| **SK 70 MD 075** [1] | 75 | 100 | 6.2 | 1.1 | 2 |  |
| **100 V** | | | | | | |
| **SK 260 MB 10** | 100 | 230 | - | 0.45 | 3 |  |
| **SK 85 MH 10 T** | 100 | 80 | - | 1.1 | 2 |  |
| **SK 115 MD 10** [1] | 100 | 80 | - | 1.1 | 3 |  |
| **SK 60 MD 10** [1] | 100 | 80 | - | 1.1 | 2 | |

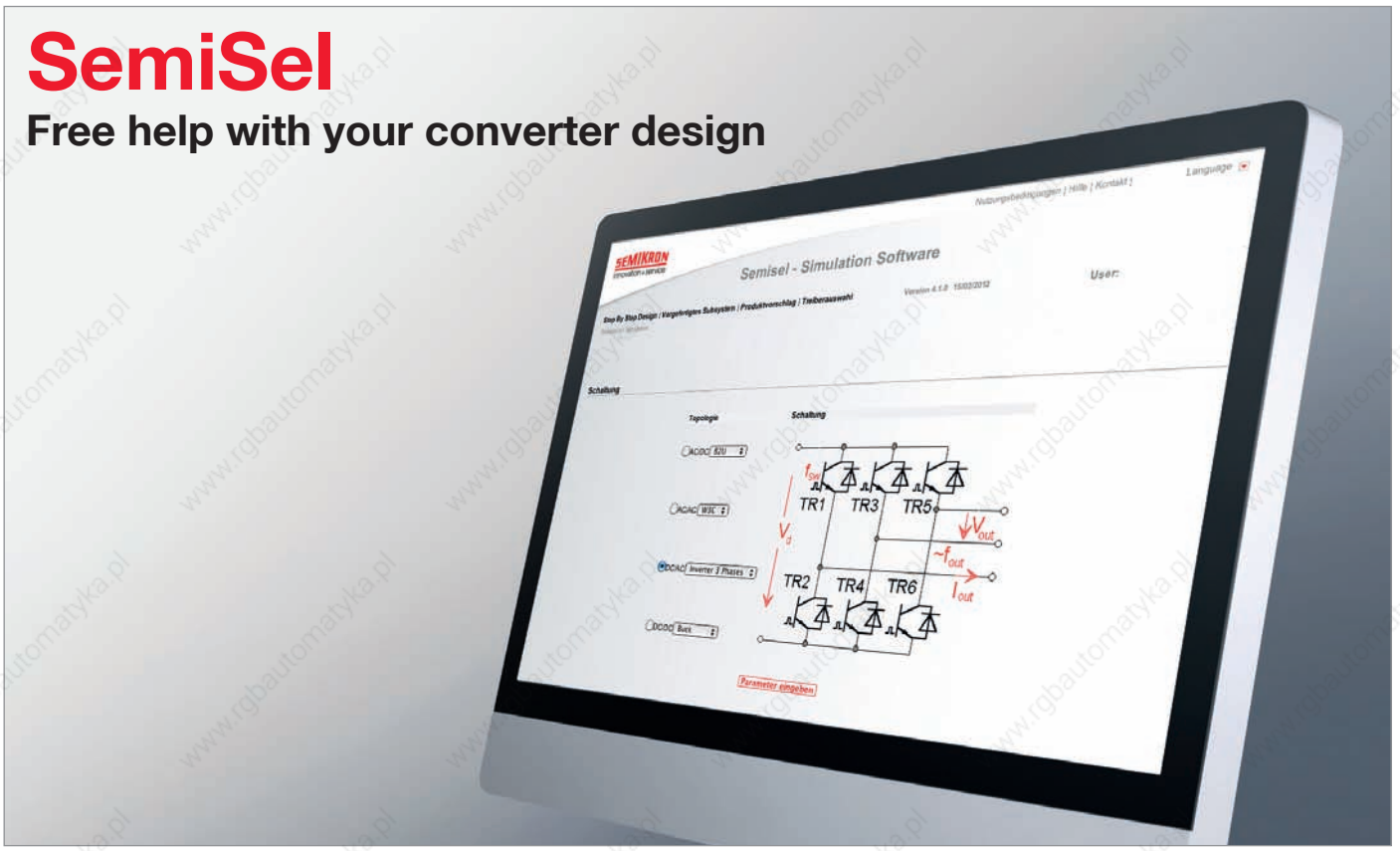
**For detailed case drawings please see page 23**

## Footnotes

[1] Not for New Design

# SemiSel

## Free help with your converter design




## Applications

SemiSel is the SEMIKRON online calculation and simulation tool for losses, temperatures and optimum choice of power electronic components (www.semikron.com). Due to ever-present cost pressure, the optimum choice of power conductor components is a must. The days when a module was purchased solely on the basis of its nominal current are over. Today, increased product diversity in the field of power semiconductors calls for comparisons over and above the information contained in data sheets. Only a comparison under application-oriented conditions such as voltage level, switching frequency or cooling conditions can demonstrate differences in the performance of the devices available. Miniaturisation coupled with higher power densities makes it essential to have the right thermal design for heat dissipation.

http://semisel.semikron.com

## Benefits

The risk arising from variations in both component and electrical circuit parameters should be considered in proper circuit design. These facts are only a few of the many points that have to be considered when developing a power electronic system. And this is where efficient support is provided by SemiSel to enable developers to make the right decisions. Many manufacturers of power semiconductors offer tools for device selection but SemiSel is still the most comprehensive free tool of this kind which can be used to investigate different power electronic circuits under different operating conditions. This program has been available online since 2001 and has been continually improved and expanded since its introduction. It provides a good compromise of user-friendliness, application fields and speed. The calculation functions range from product proposal for nominal operating conditions to drivers and heat sink specifications to product selections for specific overload conditions and complex calculations such as complete load cycles that factor in temperature cycling problems.

# Thyristor / Diode Modules

## SEMIPACK® 6

1400V-2200V
740A 1200A

## SEMIPACK® 5

1200V-2200V
460A 700A

## SEMIPACK® 3,4

800V-2200V
210A 600A

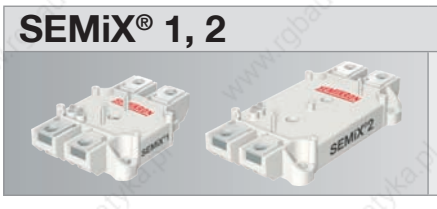
## SEMIPACK® 2

122A 200V-2200V 212A

## SEMIPACK® 0,1

400V-2200V

## SEMiX® 1, 2



1600V
140A 300A

## SEMITOP® 1, 2, 3

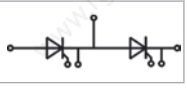
800V-1600V

## SEMIPONT® 5

1200V-1600V

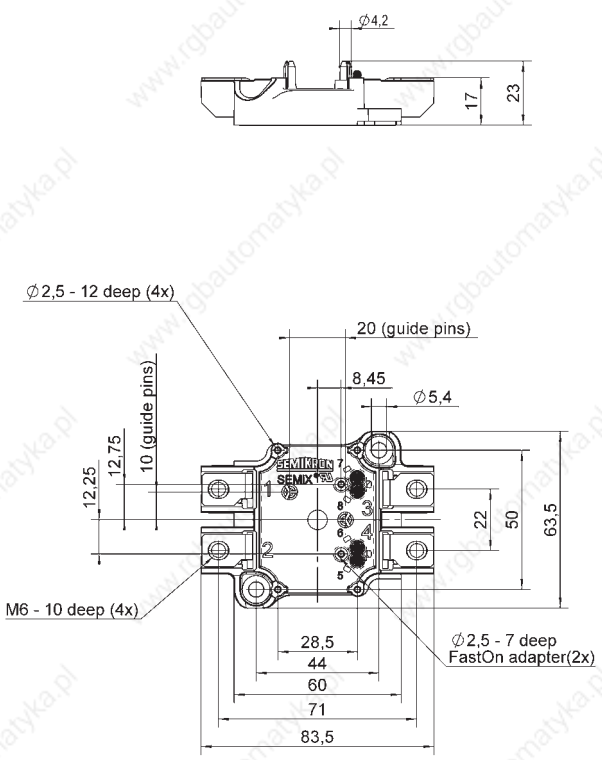
$I_{AV}$[A] 15 18 85 105 140 210/212 300 460 600 700 740 1200
122/124

# Modules - Thyristor / Diode - SEMiX

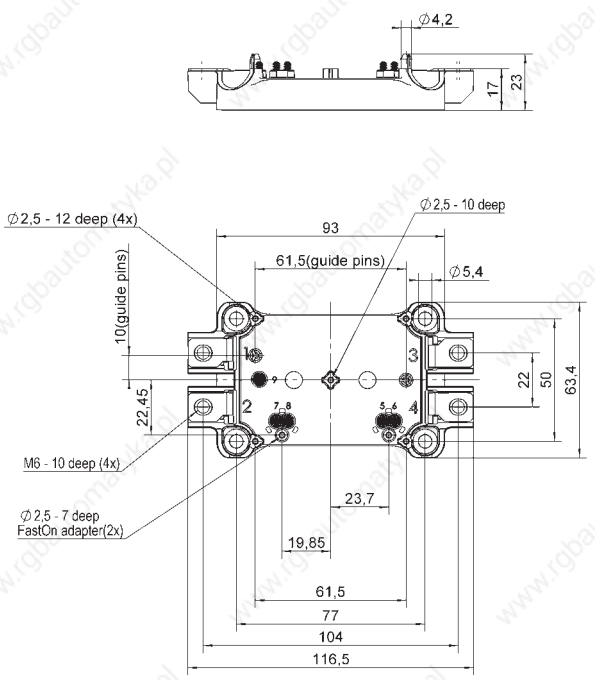
| Type | $V_{RRM}$ $V_{DRM}$ V | $I_{TAV}$ $I_{FAV}$ @$T_C$ A | $T_C$ °C | $I_{TSM}$ $I_{FSM}$ @$T_{jmax}$ A | $V_{T(TO)}$ @$T_{jmax}$ V | $r_T$ @$T_{jmax}$ mΩ | $R_{th(j-c)}$ per chip K/W | $R_{th(c-s)}$ per module K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SEMiX191KD16s** | 1600 | 190 | 85 | 5000 | 0.85 | 0.95 | 0.18 | 0.075 | -40 ... +130 | 1s | |
| **SEMiX302KD16s** | 1600 | 300 | 85 | 7500 | 0.85 | 1.1 | 0.091 | 0.045 | -40 ... +130 | 2s | |
| **SEMiX171KH16s** | 1600 | 170 | 85 | 4800 | 0.85 | 1.5 | 0.18 | 0.075 | -40 ... +130 | 1s | |
| **SEMiX302KH16s** | 1600 | 300 | 85 | 8000 | 0.85 | 1.1 | 0.091 | 0.045 | -40 ... +130 | 2s | |
| **SEMiX141KT16s** | 1600 | 140 | 85 | 3000 | 0.85 | 2.1 | 0.21 | 0.075 | -40 ... +130 | 1s |  |
| **SEMiX302KT16s** | 1600 | 300 | 85 | 8000 | 0.85 | 1.7 | 0.091 | 0.045 | -40 ... +130 | 2s | |

## Cases

### SEMiX 1s

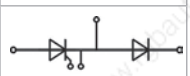
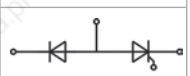



### SEMiX 2s




**Dimensions in mm**

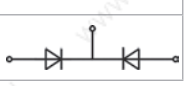
# Modules - Thyristor / Diode - SEMIPACK

| Type | $V_{RRM}$ $V_{DRM}$ | $I_{TAV}$ $I_{FAV}$ @$T_C$ | $T_C$ | $I_{TSM}$ $I_{FSM}$ @$T_{jmax}$ | $V_{T(TO)}$ @$T_{jmax}$ | $r_T$ @$T_{jmax}$ | $R_{th(j-c)}$ cont. per chip | $R_{th(c-s)}$ per chip | $T_j$ | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | V | A | °C | A | V | mΩ | K/W | K/W | °C | | |
| **SKET 330** | 800-2200 | 295 | 85 | 8000 | 1.2 | 0.55 | 0.09 | 0.02 | -40 ... +130 | 4 | |
| **SKET 400** | 800-1800 | 392 | 85 | 12000 | 0.92 | 0.3 | 0.09 | 0.02 | -40 ... +130 | 4 | |
| **SKKE 15** | 600-1600 | 14 | 85 | 280 | 0.85 | 15 | 2 | 0.2 | -40 ... +125 | 0 | |
| **SKKE 81** | 400-2200 | 82 | 85 | 1750 | 0.85 | 1.8 | 0.4 | 0.2 | -40 ... +125 | 1 | |
| **SKKE 162** | 800-1800 | 195 | 85 | 5000 | 0.85 | 1.2 | 0.17 | 0.1 | -40 ... +135 | 2 | |
| **SKKE 380** | 1200-1600 | 380 | 100 | 10000 | 0.8 | 0.35 | 0.11 | 0.04 | -40 ... +150 | 3 | |
| **SKKE 600** | 1200-2200 | 600 | 100 | 18000 | 0.75 | 0.25 | 0.07 | 0.02 | -40 ... +150 | 4 | |
| **SKKE 1200** | 1800-2200 | 1180 | 85 | 40000 | 0.72 | 0.19 | 0.0385 | 0.01 | -40 ... +125 | 6 | |
| **SKET 740** | 1800-2200 | 700 | 85 | 31000 | 0.88 | 0.28 | 0.0405 | 0.01 | -40 ... +125 | 6 | |
| **SKET 800** | 1400-1800 | 805 | 85 | 32000 | 0.83 | 0.25 | 0.0405 | 0.01 | -40 ... +130 | 6 | |
| **SKKL 92** | 800-1800 | 95 | 85 | 1750 | 0.9 | 2 | 0.28 | 0.2 | -40 ... +125 | 1 |  |
| **SKMT 92** | 800-1800 | 95 | 85 | 1750 | 0.9 | 2 | 0.28 | 0.2 | -40 ... +125 | 1 | |
| **SKNH 56** | 1200-1800 | 50 | 85 | 1250 | 0.9 | 3.5 | 0.57 | 0.2 | -40 ... +125 | 1 |  |
| **SKNH 91** | 1200-1800 | 95 | 85 | 1750 | 0.9 | 2 | 0.28 | 0.2 | -40 ... +125 | 1 | |
| **SKKD 15** | 600-1600 | 14 | 85 | 280 | 0.85 | 15.5 | 2 | 0.2 | -40 ... +125 | 0 | |
| **SKKD 26** | 1200-1600 | 31 | 85 | 480 | 0.85 | 6 | 1 | 0.2 | -40 ... +125 | 1 | |
| **SKKD 46** | 400-1800 | 47 | 85 | 600 | 0.85 | 5 | 0.6 | 0.2 | -40 ... +125 | 1 | |
| **SKKD 81** | 400-1800 | 82 | 85 | 1750 | 0.85 | 1.8 | 0.4 | 0.2 | -40 ... +125 | 1 | |
| **SKKD 81 H4** | 2000-2200 | 82 | 85 | 1750 | 0.85 | 1.8 | 0.4 | 0.2 | -40 ... +125 | 1 | |
| **SKKD 100** | 400-1800 | 100 | 85 | 2000 | 0.85 | 1.3 | 0.35 | 0.2 | -40 ... +125 | 1 | |
| **SKKD 101/16** [1] | 1600 | 115 | 85 | 2000 | 0.87 | 2.45 | 0.19 | 0.22 | -40 ... +130 | 1 | |
| **SKKD 162** | 800-2200 | 195 | 85 | 5000 | 0.85 | 1.2 | 0.17 | 0.1 | -40 ... +135 | 2 | |
| **SKKD 212** | 1200-1800 | 212 | 85 | 5500 | 0.75 | 1.05 | 0.18 | 0.1 | -40 ... +135 | 2 | |
| **SKKD 260** | 800-2200 | 260 | 100 | 10000 | 0.9 | 0.37 | 0.14 | 0.04 | -40 ... +130 | 3 | |
| **SKKD 380** | 800-2200 | 380 | 100 | 10000 | 0.8 | 0.35 | 0.11 | 0.04 | -40 ... +150 | 3 | |
| **SKKD 701** | 1200-2200 | 701 | 100 | 22500 | 0.7 | 0.28 | 0.069 | 0.02 | -40 ... +160 | 5 | |

# Modules - Thyristor / Diode - SEMIPACK

| Type | $V_{RRM}$ $V_{DRM}$ V | $I_{TAV}$ $I_{FAV}$ @$T_C$ A | $T_C$ °C | $I_{TSM}$ $I_{FSM}$ @$T_{jmax}$ A | $V_{T(TO)}$ @$T_{jmax}$ V | $r_T$ @$T_{jmax}$ mΩ | $R_{th(j-c)}$ cont. per chip K/W | $R_{th(c-s)}$ per chip K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SKKH 15** | 600-1600 | 13.5 | 85 | 280 | 1.1 | 20 | 1.6 | 0.2 | -40 ... +125 | 0 | |
| **SKKH 27** | 800-1800 | 25 | 85 | 480 | 0.9 | 12 | 0.9 | 0.2 | -40 ... +125 | 1 | |
| **SKKH 42** | 800-1800 | 40 | 85 | 850 | 1 | 4.5 | 0.65 | 0.2 | -40 ... +125 | 1 | |
| **SKKH 58/16 E** [1] | 1600 | 55 | 85 | 1200 | 1 | 4.8 | 0.47 | 0.22 | -40 ... +130 | 1 | |
| **SKKH 57** | 800-1800 | 50 | 85 | 1250 | 0.9 | 3.5 | 0.57 | 0.2 | -40 ... +125 | 1 | |
| **SKKH 57 H4** | 2000-2200 | 50 | 85 | 1250 | 0.9 | 3.5 | 0.57 | 0.2 | -40 ... +125 | 1 | |
| **SKKH 72** | 800-1800 | 70 | 85 | 1450 | 0.9 | 3.5 | 0.35 | 0.2 | -40 ... +125 | 1 | |
| **SKKH 72 H4** | 2000-2200 | 70 | 85 | 1450 | 0.9 | 3.5 | 0.35 | 0.2 | -40 ... +125 | 1 | |
| **SKKH 92** | 800-1800 | 95 | 85 | 1750 | 0.9 | 2 | 0.28 | 0.2 | -40 ... +125 | 1 | |
| **SKKH 106** | 800-1800 | 106 | 85 | 1900 | 0.9 | 2 | 0.28 | 0.2 | -40 ... +130 | 1 | |
| **SKKH 107/16 E** [1] | 1600 | 119 | 85 | 1900 | 0.9 | 3.35 | 0.19 | 0.22 | -40 ... +130 | 1 | |
| **SKKH 122** | 800-1800 | 129 | 85 | 3200 | 0.85 | 2 | 0.2 | 0.1 | -40 ... +125 | 2 | |
| **SKKH 132** | 800-1800 | 137 | 85 | 4000 | 1 | 1.6 | 0.18 | 0.1 | -40 ... +125 | 2 | |
| **SKKH 132 H4** | 2000-2200 | 128 | 85 | 4000 | 1.1 | 2 | 0.17 | 0.1 | -40 ... +125 | 2 | |
| **SKKH 162** | 800-1800 | 156 | 85 | 5000 | 0.85 | 1.5 | 0.17 | 0.1 | -40 ... +125 | 2 | |
| **SKKH 162 H4** | 2000-2200 | 143 | 85 | 5000 | 0.95 | 2 | 0.16 | 0.1 | -40 ... +125 | 2 | |
| **SKKH 172** | 1400-1800 | 175 | 85 | 5000 | 0.83 | 1.3 | 0.155 | 0.1 | -40 ... +125 | 2 | |
| **SKKH 280** | 2000-2200 | 252 | 85 | 7500 | 0.9 | 0.75 | 0.11 | 0.04 | -40 ... +125 | 3 | |
| **SKKH 250** | 1200-1800 | 250 | 85 | 8000 | 0.925 | 0.45 | 0.14 | 0.04 | -40 ... +130 | 3 | |
| **SKKH 273** | 1200-1800 | 273 | 85 | 8000 | 0.9 | 0.92 | 0.104 | 0.08 | -40 ... +130 | 3 | |
| **SKKH 330** | 800-1800 | 305 | 85 | 8000 | 0.8 | 0.6 | 0.11 | 0.04 | -40 ... +130 | 3 | |
| **SKKH 323** | 1200-1600 | 320 | 85 | 8200 | 0.81 | 0.85 | 0.091 | 0.08 | -40 ... +130 | 3 | |
| **SKKH 460** | 1600-2200 | 460 | 85 | 15500 | 0.88 | 0.45 | 0.072 | 0.02 | -40 ... +130 | 5 | |
| **SKKH 570** | 1200-1800 | 570 | 85 | 15500 | 0.78 | 0.32 | 0.069 | 0.02 | -40 ... +135 | 5 | |

# Modules - Thyristor / Diode - SEMIPACK

| Type | $V_{RRM}$ $V_{DRM}$ | $I_{TAV}$ $I_{FAV}$ @$T_C$ | $T_C$ | $I_{TSM}$ $I_{FSM}$ @$T_{jmax}$ | $V_{T(TO)}$ @$T_{jmax}$ | $r_T$ @$T_{jmax}$ | $R_{th(j-c)}$ cont. per chip | $R_{th(c-s)}$ per chip | $T_j$ | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | V | A | °C | A | V | mΩ | K/W | K/W | °C | | |
| **SKKT 15** | 600-1600 | 13.5 | 85 | 280 | 1.1 | 20 | 1.6 | 0.2 | -40 ... +125 | 0 | |
| **SKKT 20** | 800-1600 | 18 | 85 | 280 | 1 | 16 | 1.2 | 0.2 | -40 ... +125 | 1 | |
| **SKKT 20B** | 800-1600 | 18 | 85 | 280 | 1 | 16 | 1.2 | 0.2 | -40 ... +125 | 1 | |
| **SKKT 27** | 800-1600 | 25 | 85 | 480 | 0.9 | 12 | 0.9 | 0.2 | -40 ... +125 | 1 | |
| **SKKT 27B** | 800-1800 | 25 | 85 | 480 | 0.9 | 12 | 0.9 | 0.2 | -40 ... +125 | 1 | |
| **SKKT 42** | 800-1800 | 40 | 85 | 850 | 1 | 4.5 | 0.65 | 0.2 | -40 ... +125 | 1 | |
| **SKKT 42B** | 800-1800 | 40 | 85 | 850 | 1 | 4.5 | 0.65 | 0.2 | -40 ... +125 | 1 | |
| **SKKT 58/16 E** [1] | 1600 | 55 | 85 | 1200 | 1 | 4.8 | 0.47 | 0.22 | -40 ... +130 | 1 | |
| **SKKT 58B16 E** [1] | 1600 | 55 | 85 | 1200 | 1 | 4.8 | 0.47 | 0.22 | -40 ... +130 | 1 | |
| **SKKT 57** | 800-1800 | 50 | 85 | 1250 | 0.9 | 3.5 | 0.57 | 0.2 | -40 ... +125 | 1 | |
| **SKKT 57 H4** | 2000-2200 | 50 | 85 | 1250 | 0.9 | 3.5 | 0.57 | 0.2 | -40 ... +125 | 1 | |
| **SKKT 57B** | 800-1800 | 50 | 85 | 1250 | 0.9 | 3.5 | 0.57 | 0.2 | -40 ... +125 | 1 | |
| **SKKT 72** | 800-1800 | 70 | 85 | 1450 | 0.9 | 3.5 | 0.35 | 0.2 | -40 ... +125 | 1 | |
| **SKKT 72 H4** | 2000-2200 | 70 | 85 | 1450 | 0.9 | 3.5 | 0.35 | 0.2 | -40 ... +125 | 1 | |
| **SKKT 72B** | 800-1800 | 70 | 85 | 1450 | 0.9 | 3.5 | 0.35 | 0.2 | -40 ... +125 | 1 | |
| **SKKT 92** | 800-1800 | 95 | 85 | 1750 | 0.9 | 2 | 0.28 | 0.2 | -40 ... +125 | 1 | |
| **SKKT 92B** | 800-1800 | 95 | 85 | 1750 | 0.9 | 2 | 0.28 | 0.2 | -40 ... +125 | 1 | |
| **SKKT 106** | 800-1800 | 106 | 85 | 1900 | 0.9 | 2 | 0.28 | 0.2 | -40 ... +130 | 1 | |
| **SKKT 106B** | 800-1800 | 106 | 85 | 1900 | 0.9 | 2 | 0.28 | 0.2 | -40 ... +130 | 1 | |
| **SKKT 107/16 E** [1] | 1600 | 119 | 85 | 1900 | 0.9 | 3.35 | 0.19 | 0.22 | -40 ... +130 | 1 | |
| **SKKT 107B16 E** [1] | 1600 | 119 | 85 | 1900 | 0.9 | 3.35 | 0.19 | 0.22 | -40 ... +130 | 1 | |
| **SKKT 122** | 800-1800 | 129 | 85 | 3200 | 0.85 | 2 | 0.2 | 0.1 | -40 ... +125 | 2 | |
| **SKKT 132 H4** | 2000-2200 | 128 | 85 | 3800 | 1.1 | 2 | 0.18 | 0.1 | -40 ... +125 | 2 | |
| **SKKT 132** | 800-1800 | 137 | 85 | 4000 | 1 | 1.6 | 0.18 | 0.1 | -40 ... +125 | 2 | |
| **SKKT 162** | 800-1800 | 156 | 85 | 5000 | 0.85 | 1.5 | 0.17 | 0.1 | -40 ... +125 | 2 | |
| **SKKT 162 H4** | 2000-2200 | 143 | 85 | 5000 | 0.95 | 2 | 0.16 | 0.1 | -40 ... +125 | 2 | |
| **SKKT 172** | 1400-1800 | 175 | 85 | 5000 | 0.83 | 1.3 | 0.155 | 0.1 | -40 ... +125 | 2 | |
| **SKKT 280** | 2000-2200 | 252 | 85 | 7500 | 0.9 | 0.75 | 0.11 | 0.04 | -40 ... +125 | 3 | |
| **SKKT 250** | 800-1800 | 250 | 85 | 8000 | 0.925 | 0.45 | 0.14 | 0.04 | -40 ... +130 | 3 | |
| **SKKT 273** | 1200-1800 | 273 | 85 | 8000 | 0.9 | 0.92 | 0.104 | 0.08 | -40 ... +130 | 3 | |
| **SKKT 330** | 800-1800 | 305 | 85 | 8000 | 0.8 | 0.6 | 0.11 | 0.04 | -40 ... +130 | 3 | |
| **SKKT 323** | 1200-1600 | 320 | 85 | 8200 | 0.81 | 0.85 | 0.091 | 0.08 | -40 ... +130 | 3 | |
| **SKKT 460** | 1600-2200 | 460 | 85 | 15500 | 0.88 | 0.45 | 0.072 | 0.02 | -40 ... +130 | 5 | |
| **SKKT 460 H4** | 2000-2200 | 460 | 85 | 15500 | 0.88 | 0.45 | 0.072 | 0.02 | -40 ... +130 | 5 | |
| **SKKT 570** | 1200-1800 | 570 | 85 | 15500 | 0.78 | 0.32 | 0.069 | 0.02 | -40 ... +135 | 5 | |
| **SKMD 100** | 400-1600 | 100 | 85 | 2000 | 0.85 | 1.3 | 0.35 | 0.2 | -40 ... +125 | 1 |  |

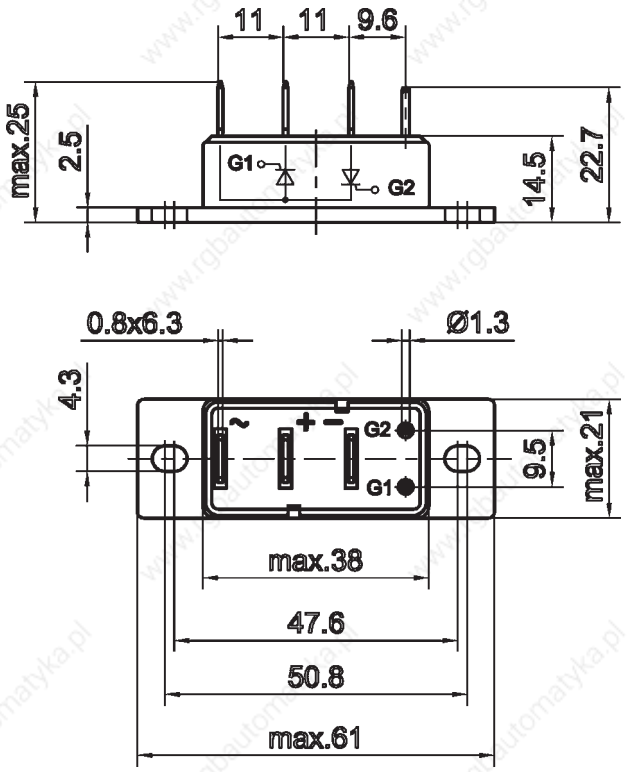
**Footnotes**

[1] New

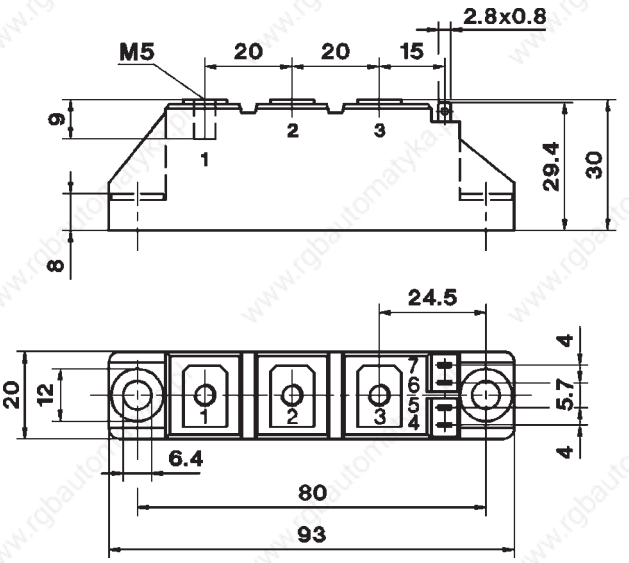
# Modules - Thyristor / Diode - SEMIPACK

## Cases

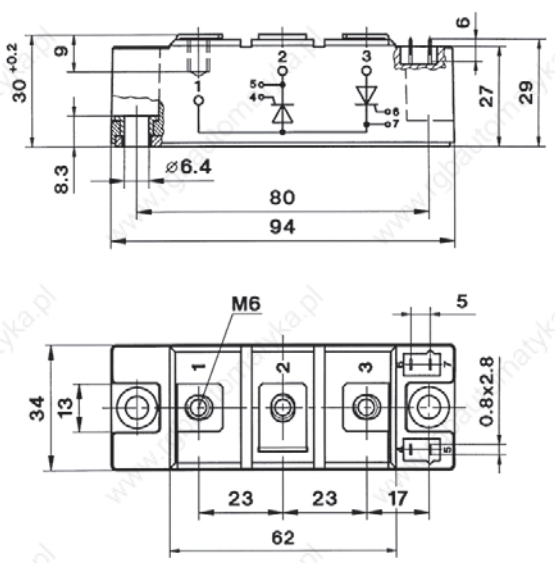
### SEMIPACK 0



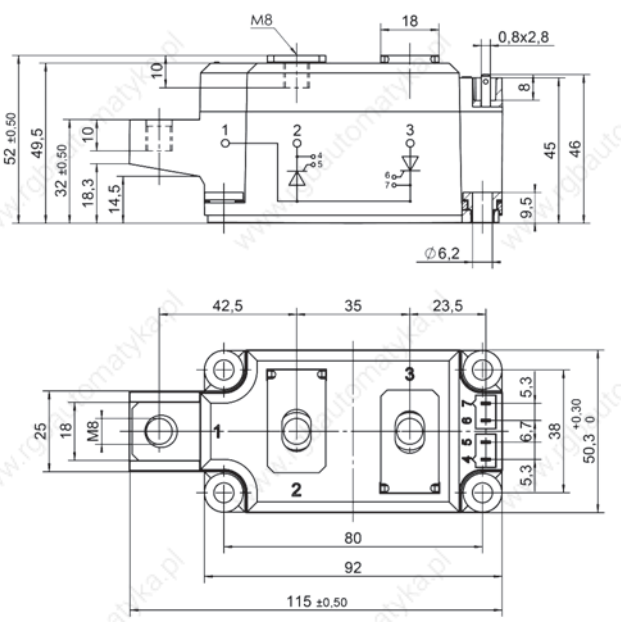

### SEMIPACK 1




### SEMIPACK 2




### SEMIPACK 3

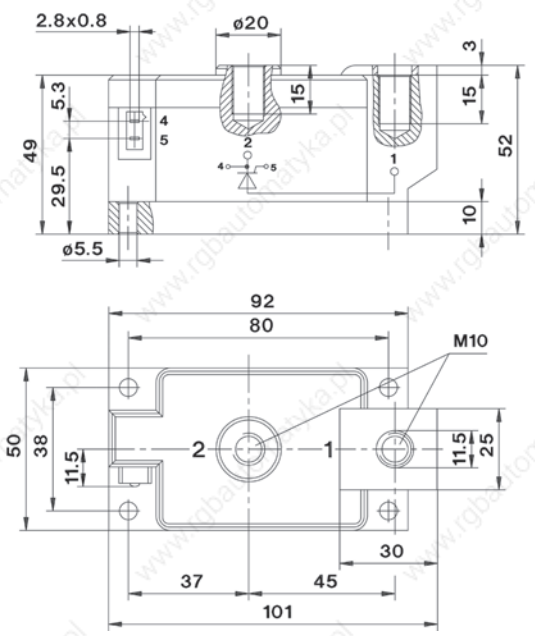



Dimensions in mm

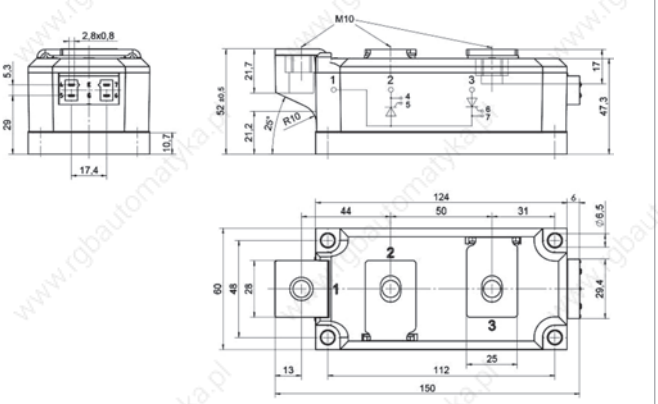
# Modules - Thyristor / Diode - SEMIPACK

## Cases

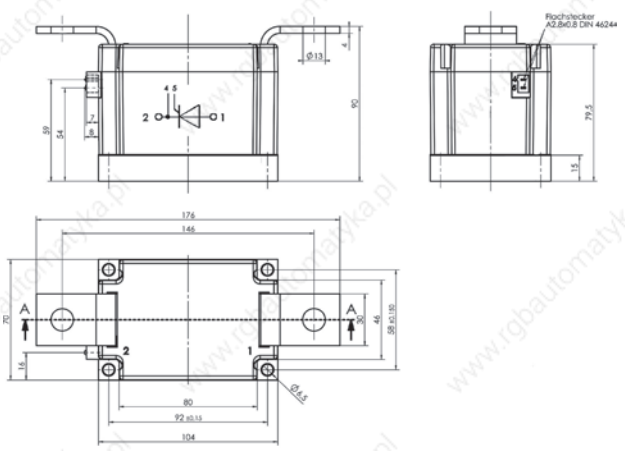
### SEMIPACK 4




### SEMIPACK 5

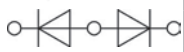



### SEMIPACK 6



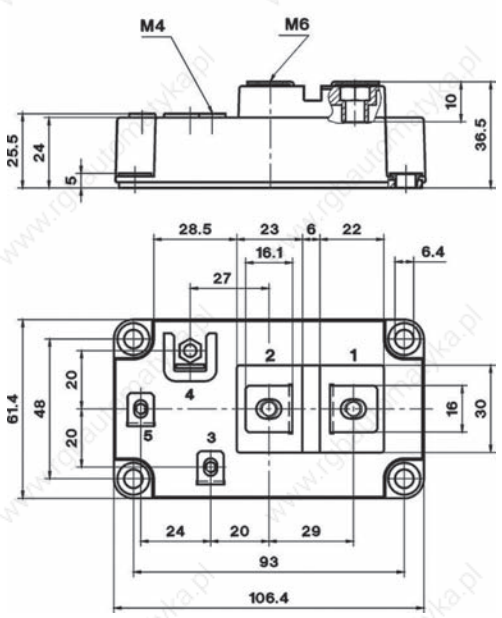

Dimensions in mm

# Modules - Thyristor / Diode - SEMIPACK Fast

| Type | $V_{RRM}$ $V_{DRM}$ V | $I_{TAV}$ $I_{FAV}$ @$T_C$ A | $T_C$ °C | $I_{FSM}$ @$T_{jmax}$ A | $V_{T(TO)}$ @$T_{jmax}$ V | $r_T$ @$T_{jmax}$ mΩ | $R_{th(j-c)}$ per chip K/W | $R_{th(c-s)}$ per chip K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SKKE 120F** | 1700 | 120 | 82 | 1800 | 1.5 | 4.5 | 0.2 | 0.05 | -40 ... +150 | 2 | |
| **SKKE 290F** | 600 | 290 | 109 | 6000 | 0.9 | 1.2 | 0.08 | 0.05 | -40 ... +150 | 2 | |
| **SKKE 301F** | 1200 | 300 | 43 | 3600 | 1.2 | 2.75 | 0.11 | 0.05 | -40 ... +150 | 2 | |
| **SKKE 310F** | 1200 | 310 | 84 | 5500 | 1.2 | 1.9 | 0.08 | 0.05 | -40 ... +150 | 2 | |
| **SKKE 330F** [1] | 1700 | 330 | 70 | 5200 | 1.5 | 1.9 | 0.079 | 0.038 | -40 ... +150 | 4 | |
| **SKKE 600F** [1] | 1200 | 600 | 85 | 5800 | 1.2 | 1.9 | 0.062 | 0.038 | -40 ... +150 | 4 | |
| **SKKD 40F** | 400-1000 | 40 | 80 | 940 | 1.2 | 4 | 0.7 | 0.2 | -40 ... +125 | 1 | |
| **SKKD 42F** | 1000-1500 | 42 | 85 | 1100 | 1 | 5 | 0.7 | 0.2 | -40 ... +130 | 1 | |
| **SKKD 60F** | 1700 | 60 | 83 | 900 | 1.5 | 9 | 0.4 | 0.1 | -40 ... +150 | 2 | |
| **SKKD 75F12** | 1200 | 75 | 55 | 900 | 1.2 | 11 | 0.4 | 0.1 | -40 ... +150 | 2 | |
| **SKKD 105F** | 800-1600 | 105 | 83 | 2100 | 1.2 | 2.5 | 0.24 | 0.2 | -40 ... +130 | 1 | |
| **SKKD 115F** | 1200-1400 | 115 | 83 | 2100 | 1.1 | 2 | 0.24 | 0.2 | -40 ... +130 | 1 | |
| **SKKD 150F** | 1200 | 150 | 54 | 1800 | 1.2 | 5.5 | 0.2 | 0.1 | -40 ... +150 | 2 | |
| **SKKD 170F** | 1200 | 170 | 85 | 2300 | 1.2 | 3.5 | 0.14 | 0.1 | -40 ... +150 | 2 | |
| **SKKD 205F** | 600 | 205 | 87 | 3000 | 0.9 | 2 | 0.16 | 0.1 | -40 ... +150 | 2 | |
| **SKMD 40F** | 400-1000 | 40 | 80 | 940 | 1.2 | 4 | 0.7 | 0.2 | -40 ... +125 | 1 | |
| **SKMD 42F** | 1000-1500 | 42 | 85 | 1100 | 1 | 5 | 0.7 | 0.2 | -40 ... +130 | 1 | |
| **SKMD 105F** | 800-1600 | 105 | 83 | 2100 | 1.2 | 2.5 | 0.24 | 0.2 | -40 ... +130 | 1 | |
| **SKMD 150F12** | 1200 | 150 | 54 | 1800 | 1.2 | 5.5 | 0.2 | 0.1 | -40 ... +150 | 2 | |
| **SKMD 202E** | 200-300 | 202 | 87 | 2800 | 0.8 | 1.5 | 0.2 | 0.1 | -40 ... +150 | 2 | |
| **SKND 42F** | 1000-1500 | 42 | 85 | 1100 | 1 | 5 | 0.7 | 0.2 | -40 ... +130 | 1 |  |
| **SKND 105F** | 800-1600 | 105 | 83 | 2100 | 1.2 | 2.5 | 0.24 | 0.2 | -40 ... +130 | 1 | |
| **SKND 150F** | 1200 | 150 | 54 | 1800 | 1.2 | 5.5 | 0.2 | 0.1 | -40 ... +150 | 2 | |
| **SKND 202E** | 200-300 | 202 | 87 | 2800 | 0.8 | 1.5 | 0.2 | 0.1 | -40 ... +150 | 2 | |
| **SKND 205F** | 600 | 205 | 87 | 3000 | 0.9 | 2 | 0.16 | 0.1 | -40 ... +150 | 2 | |

## Cases

### SEMIPACK Fast in SEMITRANS 4

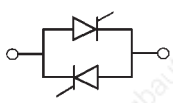
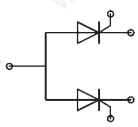
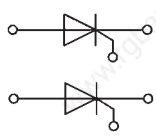
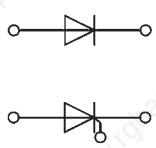
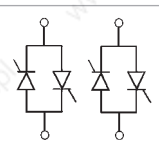
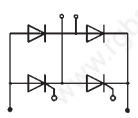
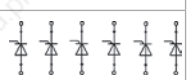
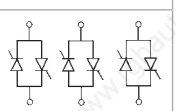
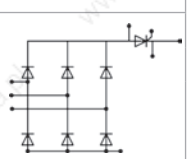



**Dimensions in mm**

## Footnotes

[1] SEMIPACK Fast in SEMITRANS 4 case

# Modules - Thyristor / Diode - SEMITOP

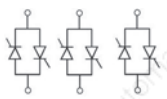
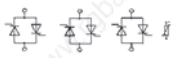
| Type | $V_{RRM}$ $V_{DRM}$ V | $I_{TAV}$ $I_{FAV}$ @$T_C$ A | $T_C$ °C | $I_{TSM}$ $I_{FSM}$ @$T_{jmax}$ A | $V_{T(TO)}$ @$T_{jmax}$ V | $r_T$ @$T_{jmax}$ mΩ | $R_{th(j-s)}$ cont. per chip K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|
| **SK 25 KQ** | 800-1600 | 29 | 85 | 280 | 1.1 | 20 | 1.7 | -40 ... +125 | 1 |  |
| **SK 45 KQ** | 800-1600 | 47 | 85 | 380 | 1 | 10 | 1.2 | -40 ... +125 | 1 | |
| **SK 70 KQ** | 800-1600 | 72 | 85 | 900 | 1 | 6 | 0.8 | -40 ... +125 | 1 | |
| **SK 100 KQ** | 800-1600 | 101 | 85 | 1350 | 0.9 | 4.5 | 0.6 | -40 ... +125 | 2 | |
| **SK 120 KQ** | 800-1600 | 134 | 85 | 1800 | 0.9 | 3.5 | 0.45 | -40 ... +125 | 2 | |
| **SK 35 NT** [1] | 800-1600 | 33 | 85 | 900 | 1 | 6 | 0.8 | -40 ... +125 | 1 |  |
| **SK 35 TAA** | 800-1600 | 35 | 80 | 380 | 0.85 | 9.1 | 1.2 | -40 ... +130 | 2 |  |
| **SK 55 TAA** | 800-1600 | 55 | 80 | 900 | 0.85 | 5.7 | 0.8 | -40 ... +130 | 2 | |
| **SK 75 TAA** | 800-1600 | 75 | 80 | 1500 | 0.9 | 4.5 | 0.6 | -40 ... +130 | 2 | |
| **SK 100 TAA** | 800-1600 | 100 | 80 | 2000 | 0.9 | 3.5 | 0.45 | -40 ... +130 | 2 | |
| **SK 75 TAE 12** | 1200 | 75 | 80 | 1250 | 0.85 | 4.4 | 0.6 | -40 ... +130 | 2 |  |
| **SK 25 WT** | 800-1600 | 29 | 85 | 280 | 1.1 | 20 | 1.7 | -40 ... +125 | 2 |  |
| **SK 45 WT** | 800-1600 | 47 | 85 | 380 | 1 | 10 | 1.2 | -40 ... +125 | 2 | |
| **SK 70 WT** | 800-1600 | 72 | 85 | 900 | 1 | 6 | 0.8 | -40 ... +125 | 3 | |
| **SK 100 WT** | 800-1600 | 101 | 85 | 1350 | 0.9 | 4.5 | 0.6 | -40 ... +125 | 3 | |
| **SK 35 BZ** | 800-1600 | 35 | 80 | 270 | 0.85 | 14 | 1.7 | -40 ... +125 | 2 |  |
| **SK 45 STA** | 800-1600 | 47 | 75 | 380 | 1 | 10 | 1.2 | -40 ... +125 | 3 |  |
| **SK 25 UT** | 800-1600 | 29 | 85 | 280 | 1.1 | 20 | 1.7 | -40 ... +125 | 3 |  |
| **SK 45 UT** | 800-1600 | 47 | 85 | 380 | 1 | 10 | 1.2 | -40 ... +125 | 2 | |
| **SK 30 DTA** | 800-1600 | 25 | 80 | 900 | 1 | 6 | 1.7 | -40 ... +150 | 3 |  |
| **SK 60 DTA** | 800-1600 | 61 | 80 | 1350 | 0.9 | 0.6 | 0.6 | -40 ... +125 | 3 | |
| **SK 80 DTA** | 800-1600 | 65 | 80 | 1800 | 0.9 | 3.5 | 1 | -40 ... +150 | 3 | |

**For detailed case drawings please see page 23**

## Footnotes

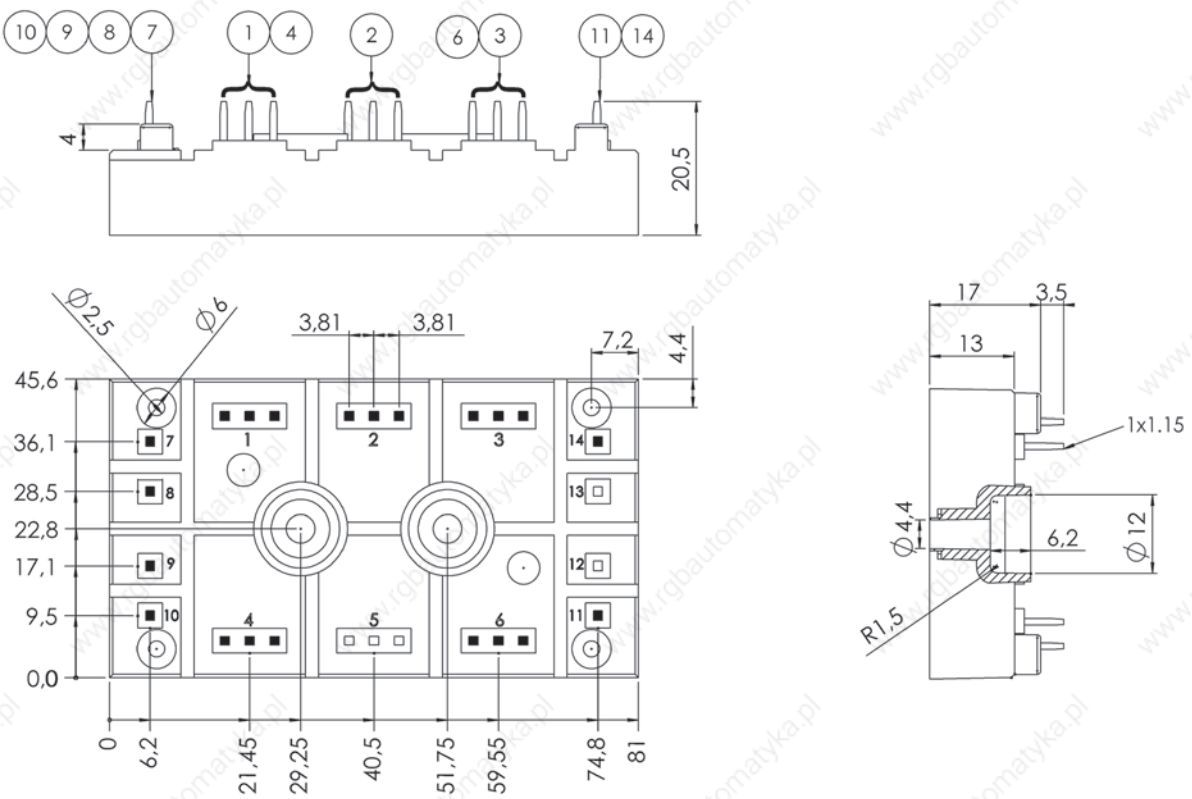
[1] Not for New Design

# Modules - Thyristor / Diode - SEMIPONT

| Type | $V_{RRM}$ $V_{DRM}$ V | $I_{RMS}$ @$T_C$ A | $T_C$ °C | $I_{TSM}$ $I_{FSM}$ @$T_{jmax}$ A | $V_{T(TO)}$ @$T_{jmax}$ V | $r_T$ @$T_{jmax}$ mΩ | $R_{th(j-s)}$ cont. per chip K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|
| **SKUT 85** | 1200-1600 | 85 | 85 | 1050 | 1.1 | 6 | 0.85 | -40 ... +125 | 5 |  |
| **SKUT 115** | 1200-1600 | 105 | 85 | 1250 | 0.9 | 5 | 0.63 | -40 ... +125 | 5 | |
| **SKUT 85 T** | 1200-1600 | 85 | 85 | 1050 | 1.1 | 6 | 0.85 | -40 ... +125 | 5 |  |
| **SKUT 115 T** | 1200-1600 | 105 | 85 | 1250 | 0.9 | 5 | 0.63 | -40 ... +125 | 5 | |

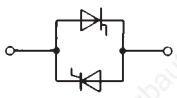
## Cases

### SEMIPONT 5



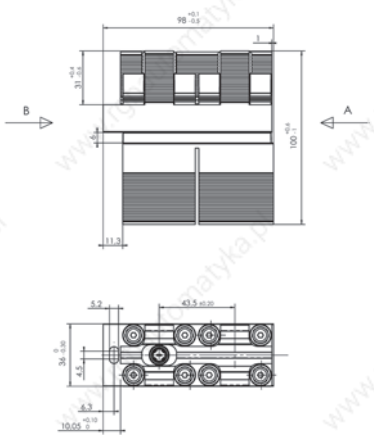

**Dimensions in mm**

# Modules - Thyristors - SEMiSTART

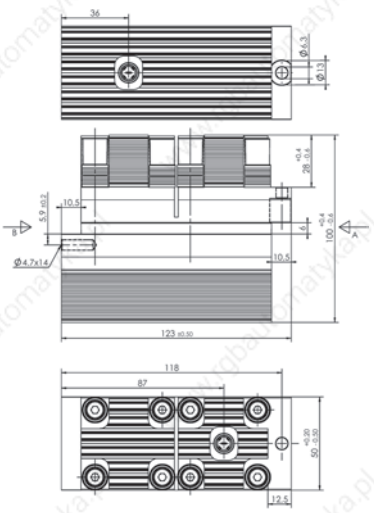
| Type | $V_{RRM}$ $V_{DRM}$ V | $I_{overload}$ W1C (for 20s) A | $T_C$ °C | $I_{TSM}$ @$T_j$= 125°C A | $V_{T(TO)}$ @$T_j$= 125°C V | $r_T$ @$T_j$= 125°C mΩ | $R_{th(j-s)}$ cont. per chip K/W | $T_j$ (for 20s) °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|
| **SKKQ 560** | 1400-1800 | 560 | 150 | 5200 | 0.9 | 0.9 | 0.106 | 150 | 1 |  |
| **SKKQ 800** | 1400-1800 | 800 | 150 | 5200 | 0.9 | 0.8 | 0.106 | 150 | 2 | |
| **SKKQ 1200** | 1400-1800 | 1225 | 150 | 8000 | 0.9 | 0.5 | 0.066 | 150 | 2 | |
| **SKKQ 1500** | 1400-1800 | 1500 | 150 | 15000 | 0.85 | 0.3 | 0.037 | 150 | 2 | |
| **SKKQ 3000** | 1400-1800 | 3080 | 150 | 25500 | 0.95 | 0.18 | 0.026 | 150 | 3 | |

## Cases

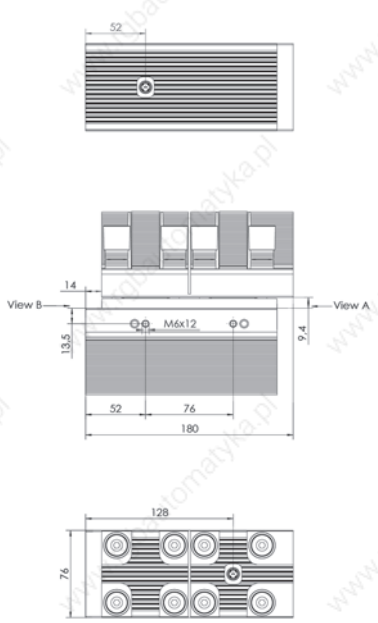
### SEMiSTART 1



### SEMiSTART 2



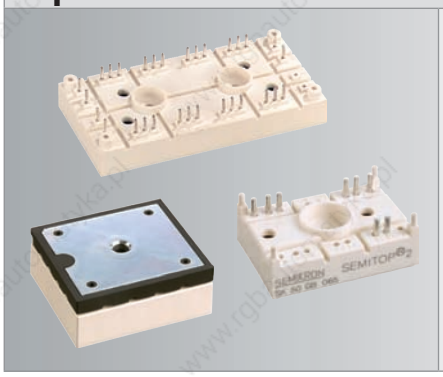
### SEMiSTART 3



**Dimensions in mm**

# Bridge Rectifier

## Input rectifier+brake chopper



55A 140A

170A 260A

## 3 phase input

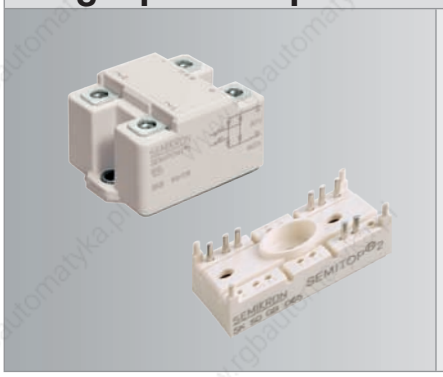
40A 110A

40A 140A

35A 220A

240A 490A

## Single phase input



30A 46A

24A 46A

2A 85A

## Miniature Bridge Rectifier

### Leaded

9A 25A

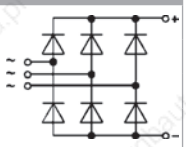
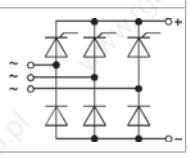
### Fast on

17A 35A

$I_D$ [A] 2 9 24 30 35 40 46 55 85 110 140 170 220 260 490

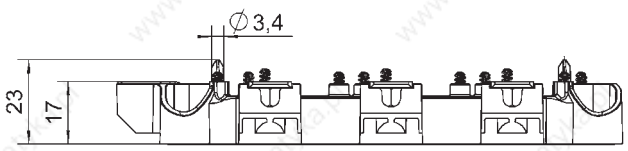
25 240

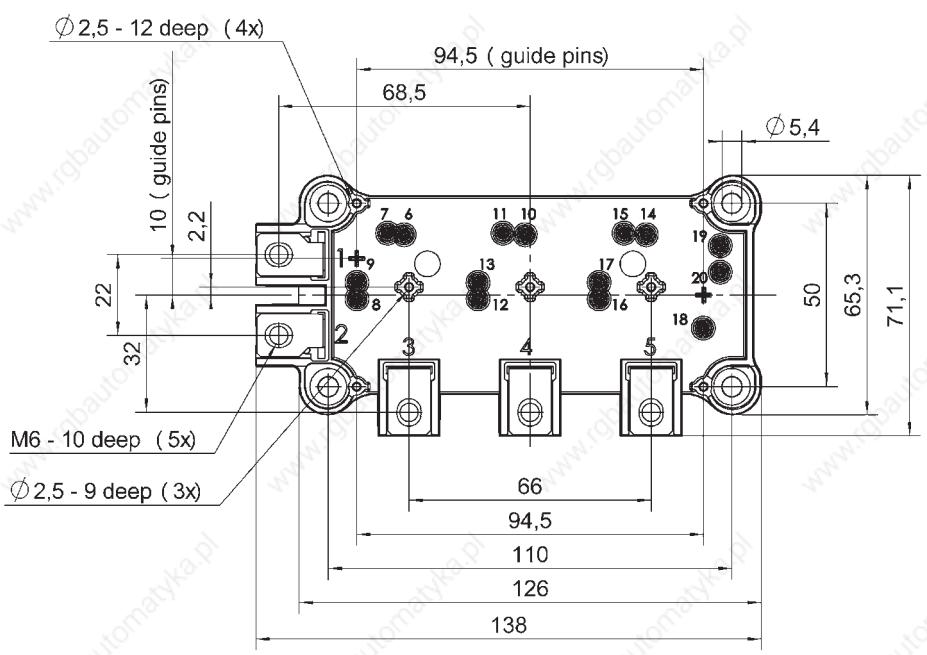
# Modules - Bridge - SEMiX

| Type | $V_{RRM}$ $V_{DRM}$ V | $I_D$ @$T_C$ A | $T_C$ °C | $I_{TSM}$ $I_{FSM}$ @$T_{jmax}$ A | $V_{T(TO)}$ @$T_{jmax}$ V | $r_T$ @$T_{jmax}$ mΩ | $R_{th(j-c)}$ per chip K/W | $R_{th(c-s)}$ per module K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SEMiX251D12Fs** | 1200 | 250 | 85 | 1330 | 1.2 | 7 | 0.26 | 0.04 | -40 ... +150 | 13 |  |
| **SEMiX291D16s** [1] | 1600 | 290 | 85 | 1380 | 0.83 | 4.6 | 0.45 | 0.04 | -40 ... +130 | 13 | |
| **SEMiX341D16s** | 1600 | 340 | 85 | 2000 | 0.9 | 2.7 | 0.22 | 0.04 | -40 ... +130 | 13 | |
| **SEMiX501D17Fs** [1] | 1700 | 489 | 85 | 2140 | 1.1 | 2.7 | 0.165 | 0.04 | -40 ... +150 | 13 | |
| **SEMiX241DH16s** | 1600 | 240 | 85 | 1900 | 0.85 | 4 | 0.32 | 0.04 | -40 ... +130 | 13 |  |

## Cases

### SEMiX 13



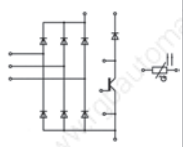
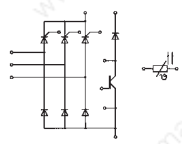




Dimensions in mm

## Footnotes

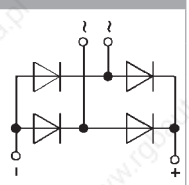
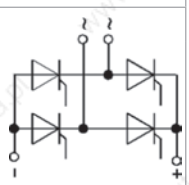
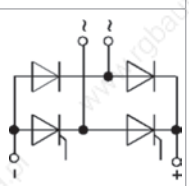
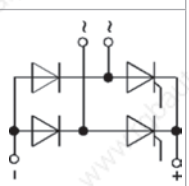
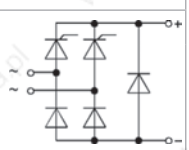
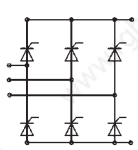
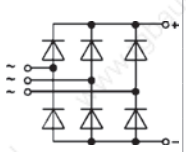
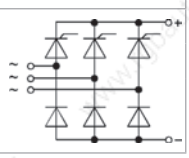
[1] New

# Modules - Bridge - MiniSKiiP

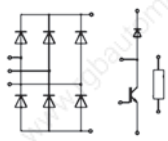
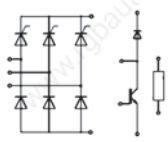
| Type | IGBT | | | | | | Diode | | | | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $I_C$ @$T_s$= 25°C | $I_{Cnom}$ | $V_{CE(sat)}$ @$T_j$= 25°C typ. | $E_{on}$ | $E_{off}$ | $R_{th(j-s)}$ | $I_F$ @$T_s$= 25°C | $V_F$ @$T_j$= 25°C typ. | $E_{rr}$ | $R_{th(j-s)}$ | | |
| | A | A | V | mJ | mJ | K/W | A | V | mJ | K/W | | |
| **1200 V - IGBT 3 (Trench)** | | | | | | | | | | | | |
| **SKiiP 28ANB16V1** | 118 | 105 | 1.7 | 13.1 | 13 | 0.4 | 118 | 1.60 | 11.2 | 0.55 | II 2 |  |
| **SKiiP 39ANB16V1** | 157 | 140 | 1.7 | 19.9 | 17.2 | 0.3 | 167 | 1.50 | 16.2 | 0.4 | II 3 | |
| **SKiiP 28AHB16V1** | 118 | 105 | 1.7 | 14.4 | 13.3 | 0.4 | 118 | 1.60 | 10.8 | 0.55 | II 2 |  |
| **SKiiP 39AHB16V1** | 157 | 140 | 1.7 | 19.9 | 17.3 | 0.3 | 167 | 1.50 | 16.2 | 0.4 | II 3 | |

**For detailed case drawings please see page 38**

# Modules - Bridge - SEMIPONT

| Type | $V_{RRM}$ $V_{DRM}$ V | $I_D$ @$T_C$ A | $T_C$ °C | $I_{TSM}$ $I_{FSM}$ @$T_{jmax}$ A | $V_{T(TO)}$ @$T_{jmax}$ V | $r_T$ @$T_{jmax}$ mΩ | $R_{th(j-c)}$ cont. per chip K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|
| **1 and 3 phase** | | | | | | | | | | |
| **SKB 52** | 400-1800 | 50 | 99 | 425 | 0.85 | 8 | 1.5 | -40 ... +150 | 3 |  |
| **SKB 60** | 400-1600 | 60 | 88 | 850 | 0.85 | 5 | 1 | -40 ... +125 | 2 | |
| **SKB 72** | 400-1800 | 70 | 101 | 640 | 0.85 | 5 | 1.1 | -40 ... +150 | 3 | |
| **SKBT 28** | 600-1400 | 28 | 89 | 280 | 1 | 16 | 1.8 | -40 ... +125 | 1 |  |
| **SKBT 40** | 800-1400 | 46 | 92 | 400 | 1 | 16 | 1 | -40 ... +125 | 2 | |
| **SKBZ 28** | 400-1400 | 28 | 89 | 280 | 1 | 16 | 1.8 | -40 ... +125 | 1 |  |
| **SKBH 28** | 600-1400 | 28 | 89 | 280 | 1 | 16 | 1.8 | -40 ... +125 | 1 |  |
| **SKCH 28** | 400-1400 | 28 | 89 | 280 | 1 | 16 | 1.8 | -40 ... +125 | 1 |  |
| **SKCH 40** | 400-1600 | 40 | 92 | 400 | 1 | 16 | 1 | -40 ... +125 | 2 | |
| **SKDT 60** | 400-1400 | 60 | 86 | 400 | 1 | 16 | 1 | -40 ... +125 | 2 |  |
| **SKDT 115** | 1200-1600 | 110 | 80 | 950 | 1.1 | 6 | 0.84 | -40 ... +125 | 5 | |
| **SKDT 145** | 1200-1600 | 140 | 80 | 1250 | 0.9 | 5 | 0.6 | -40 ... +125 | 5 | |
| **SKD 31** | 200-1600 | 31 | 100 | 320 | 0.85 | 12 | 2 | -40 ... +125 | 1 | |
| **SKD 60** | 400-1600 | 60 | 102 | 850 | 0.85 | 5 | 1 | -40 ... +125 | 2 | |
| **SKD 62** | 400-1800 | 60 | 110 | 425 | 0.85 | 8 | 1.5 | -40 ... +150 | 3 | |
| **SKD 82** | 400-1800 | 80 | 110 | 640 | 0.85 | 5 | 1.1 | -40 ... +150 | 3 |  |
| **SKD 100** | 400-1600 | 100 | 93 | 1000 | 0.85 | 5 | 0.85 | -40 ... +125 | 2 | |
| **SKD 110** | 800-1800 | 110 | 100 | 1000 | 0.85 | 4 | 0.9 | -40 ... +150 | 4 | |
| **SKD 115** | 1200-1800 | 110 | 85 | 1150 | 0.8 | 7 | 1 | -40 ... +150 | 5 | |
| **SKD 145** | 1200-1800 | 140 | 85 | 1700 | 0.8 | 4 | 0.8 | -40 ... +150 | 5 | |
| **SKD 160** | 800-1800 | 205 | 100 | 1500 | 0.85 | 3 | 0.65 | -40 ... +150 | 4 | |
| **SKD 210** | 900-1800 | 207 | 99 | 1600 | 0.85 | 3 | 0.5 | -40 ... +150 | 4 | |
| **SKDH 100** | 800-1400 | 100 | 84 | 850 | 1 | 4.5 | 0.85 | -40 ... +125 | 2 |  |
| **SKDH 115** | 1200-1600 | 110 | 80 | 950 | 1.1 | 6 | 0.84 | -40 ... +125 | 5 | |
| **SKDH 145** | 1200-1600 | 110 | 80 | 1250 | 0.9 | 5 | 0.63 | -40 ... +125 | 5 | |

# Modules - Bridge - SEMIPONT

| Type | $V_{RRM}$ $V_{DRM}$ V | $I_D$ @$T_C$ A | $T_C$ °C | $I_{TSM}$ $I_{FSM}$ @$T_{jmax}$ A | $V_{T(TO)}$ @$T_{jmax}$ V | $r_T$ @$T_{jmax}$ mΩ | $R_{th(j-c)}$ cont. per chip K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|
| **3 phase with brake chopper** | | | | | | | | | | |
| **SKD 116/..-L100** [1] | 1200-1600 | 110 | 85 | 950 | 0.8 | 7 | 0.3 | -40 ... +125 | 6 |  |
| **SKD 116/..-L105** | 1200-1600 | 110 | 85 | 1050 | 0.8 | 7 | 1 | -40 ... +125 | 6 | |
| **SKD 116/..-L140** | 1200-1600 | 110 | 85 | 1050 | 0.8 | 7 | 1 | -40 ... +125 | 6 | |
| **SKD 116/..-L75** [1] | 1200-1600 | 110 | 85 | 1050 | 0.8 | 7 | 0.4 | -40 ... +125 | 6 | |
| **SKD 146/..-L100** [1] | 1200-1600 | 140 | 85 | 1250 | 0.8 | 4 | 0.8 | -40 ... +125 | 6 | |
| **SKD 146/..-L105** | 1200-1600 | 140 | 85 | 1250 | 0.8 | 4 | 0.8 | -40 ... +125 | 6 | |
| **SKD 146/..-L75** [1] | 1200-1600 | 140 | 85 | 1250 | 0.8 | 4 | 0.4 | -40 ... +125 | 6 | |
| **SKD146/..-L140T4** | 1200-1600 | 140 | 85 | 1250 | 0.8 | 4 | 0.8 | -40 ... +125 | 6 | |
| **SKDH 116/..-L100** [1] | 1200-1600 | 110 | 80 | 950 | 1.1 | 6 | 0.85 | -40 ... +125 | 6 |  |
| **SKDH 116/..-L75** [1] | 1200-1600 | 110 | 80 | 950 | 1.1 | 6 | 0.84 | -40 ... +125 | 6 | |
| **SKDH116/..L105** | 1200-1600 | 110 | 85 | 1050 | 0.8 | 7 | 1 | -40 ... +125 | 6 | |
| **SKDH116/..L140** | 1200-1600 | 110 | 85 | 1050 | 0.8 | 7 | 1 | -40 ... +125 | 6 | |
| **SKDH146/..-L105** | 1200-1600 | 110 | 85 | 1250 | 0.8 | 4 | 0.8 | -40 ... +125 | 6 | |
| **SKDH146/..-L140** | 1200-1600 | 110 | 85 | 1250 | 0.8 | 4 | 0.8 | -40 ... +125 | 6 | |
| **SKDH 146/..-L100** [1] | 1200-1600 | 140 | 80 | 1250 | 0.8 | 4 | 0.3 | -40 ... +125 | 6 | |
| **SKDH 146/..-L75** [1] | 1200-1600 | 140 | 80 | 1250 | 0.8 | 4 | 0.4 | -40 ... +150 | 6 | |
| **SKDH 146/08-L200** | 800 | 140 | 80 | 1250 | 0.85 | 3 | 0.6 | -40 ... +125 | 6 | |

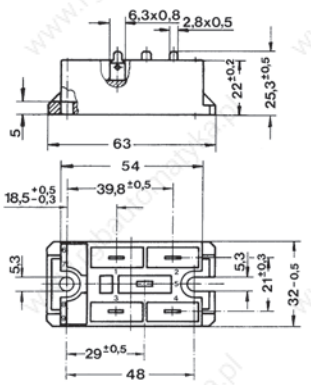
**Footnotes**

[1] Not for New Design

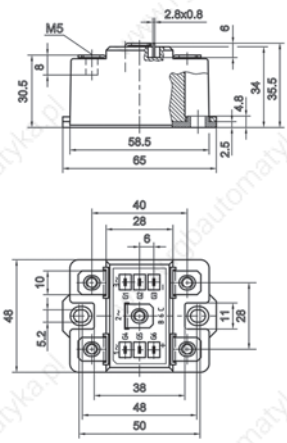
# Modules - Bridge - SEMIPONT

## Cases

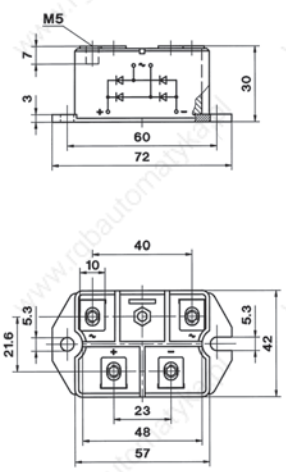
### SEMIPONT 1



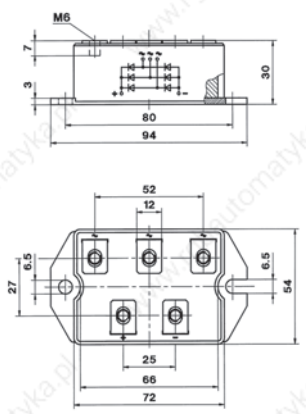

### SEMIPONT 2



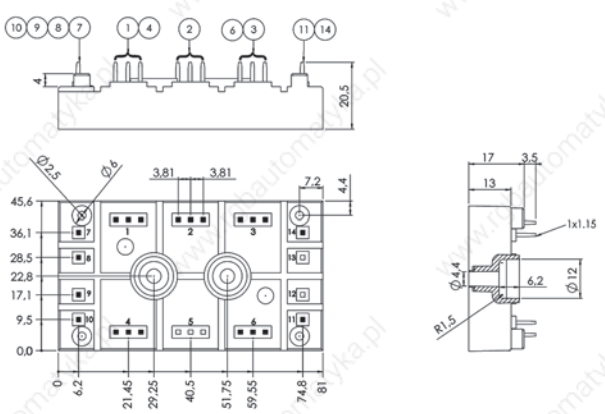

### SEMIPONT 3



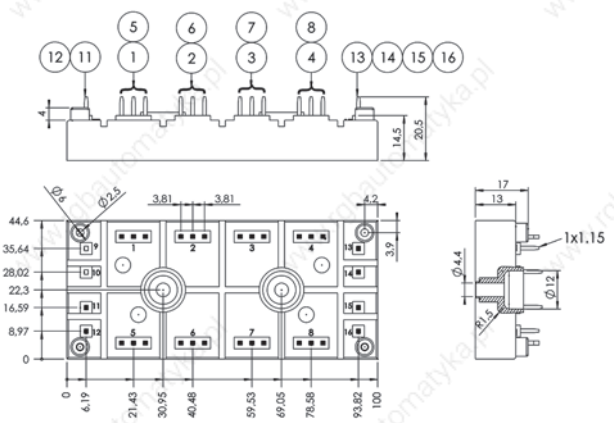

### SEMIPONT 4




### SEMIPONT 5

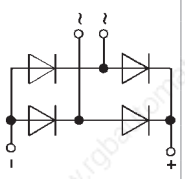
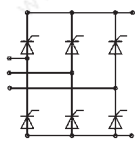
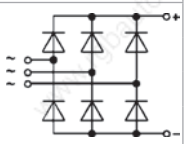
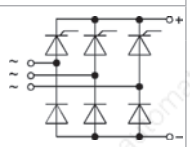
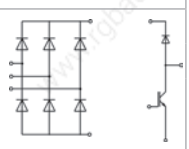
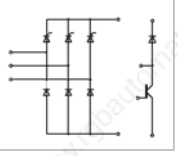



### SEMIPONT 6




**Dimensions in mm**

# Modules - Bridge - SEMITOP

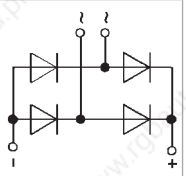
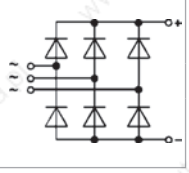
| Type | $V_{RRM}$ $V_{DRM}$ V | $I_D$ @$T_S$ A | $T_S$ °C | $I_{TSM}$ $I_{FSM}$ @$T_{jmax}$ A | $V_{T(TO)}$ @$T_{jmax}$ V | $r_T$ @$T_{jmax}$ mΩ | $R_{th(j-s)}$ per chip K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|
| **1 and 3 phase** | | | | | | | | | | |
| **SK 50 B 06 UF** | 600 | 46 | 80 | 400 | 0.8 | 11 | 0.45 | -40 ... +150 | 2 |  |
| **SK 50 B** | 800-1600 | 51 | 80 | 270 | 0.8 | 13 | 1.7 | -40 ... +150 | 2 | |
| **SK 55 B 06 F** | 600 | 54 | 80 | 440 | 0.9 | 16 | 1.2 | -40 ... +150 | 2 | |
| **SK 55 B 12 F** | 1200 | 57 | 80 | 550 | 1.2 | 22 | 0.9 | -40 ... +150 | 2 | |
| **SK 70 B** | 800-1600 | 68 | 80 | 560 | 0.8 | 11 | 1.2 | -40 ... +150 | 2 | |
| **SK 100 B** | 800-1600 | 100 | 80 | 890 | 0.83 | 3.9 | 1 | -40 ... +150 | 2 | |
| **SK 40 DT** | 800-1600 | 42 | 80 | 280 | 1.1 | 20 | 1.7 | -40 ... +125 | 3 |  |
| **SK 70 DT** | 800-1600 | 68 | 80 | 380 | 1 | 10 | 1.2 | -40 ... +125 | 3 | |
| **SK 55 D** | 800-1600 | 55 | 80 | 200 | 0.8 | 13 | 2.15 | -40 ... +150 | 2 |  |
| **SK 70 D** | 800-1600 | 70 | 80 | 270 | 0.8 | 13 | 1.7 | -40 ... +150 | 2 | |
| **SK 80 D 12F** | 1200 | 80 | 80 | 550 | 1.2 | 22 | 0.9 | -40 ... +150 | 3 | |
| **SK 95 D** | 800-1600 | 95 | 80 | 560 | 0.8 | 11 | 1.2 | -40 ... +150 | 2 | |
| **SK 40 DH** | 800-1600 | 42 | 80 | 270 | 1.1 | 20 | 1.7 | -40 ... +150 | 3 |  |
| **SK 70 DH** | 800-1600 | 68 | 80 | 270 | 1 | 10 | 1.2 | -40 ... +125 | 3 | |
| **SK 55 DGL 126** | 1200 | 55 | 80 | 370 | 0.8 | 13 | 2 | -40 ... +150 | 3 |  |
| **SK 74 DGL 063** [1)] | 600 | 74 | 80 | 370 | 0.8 | 13 | 1.7 | -40 ... +150 | 3 | |
| **SK 95 DGL 126** | 1600 | 96 | 80 | 700 | 0.8 | 11 | 1.2 | -40 ... +150 | 3 | |
| **SK 170 DHL 126** | 1200 | 170 | 70 | 1000 | 0.8 | 7 | 0.51 | -40 ... +150 | 4 |  |
| **SK 200 DHL 066** | 600 | 210 | 70 | 1250 | 0.8 | 4 | 0.52 | -40 ... +150 | 4 | |

**For detailed case drawings please see page 23**

## Footnotes

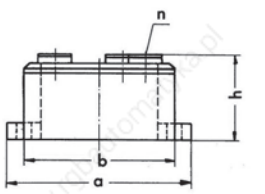
1) Not for New Design

# Modules - Bridge - Power Bridge

| Type | $V_{RRM}$ $V_{DRM}$ V | $I_D$ @$T_C$ A | $T_C$ °C | $I_{FSM}$ @$T_{jmax}$ A | $V_{T(TO)}$ @$T_{jmax}$ V | $r_T$ @$T_{jmax}$ mΩ | $R_{th(j-s)}$ cont. per chip K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|
| **1 and 3 phase** | | | | | | | | | | |
| **SKB 30** | 200-1600 | 30 | 94 | 320 | 0.85 | 12 | 3.2 | -40 ... +150 | G12 |  |
| **SKD 30** | 200-1600 | 30 | 98 | 320 | 0.85 | 12 | 4.8 | -40 ... +150 | G13 |  |
| **SKD 33** | 400-1800 | 33 | 110 | 240 | 0.8 | 18 | 2.5 | -40 ... +150 | G55 | |
| **SKD 51** | 400-1800 | 50 | 127 | 700 | 0.8 | 8.5 | 1.1 | -40 ... +150 | G51 | |
| **SKD 53** | 400-1800 | 53 | 100 | 270 | 0.8 | 13 | 1.9 | -40 ... +150 | G55 | |
| **SKD 83** | 400-1800 | 83 | 95 | 560 | 0.8 | 7.5 | 1.4 | -40 ... +150 | G55 | |

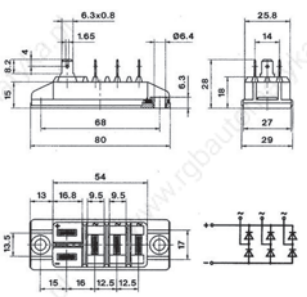
## Cases

### G 12, G 13

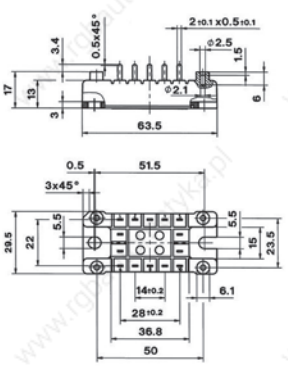



| Cases | a | b | h | n |
|---|---|---|---|---|
| G 12, 13 | 55 | 45 | 24 | M 4 |

### G 51

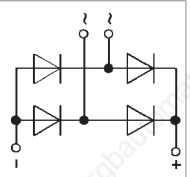
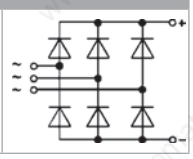



### G 55



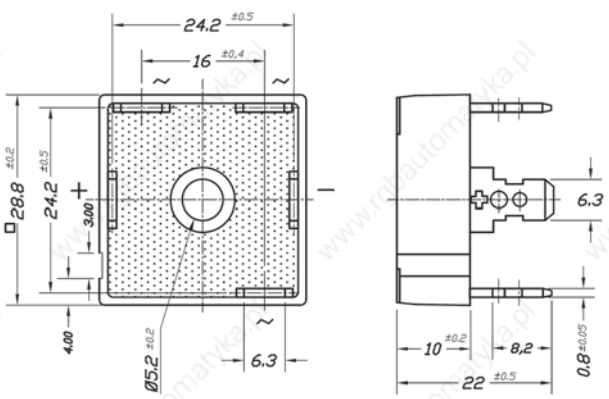

Dimensions in mm

# Modules - Miniature Bridge - Fast-on

| Type | $V_{RRM}$ $V_{DRM}$ V | $I_D$ @$T_C$ A | $T_C$ °C | $I_{FSM}$ @$T_j$= 25°C A | $V_F$ @ $I_F$ $T_j$= 25°C V | $I_F$ @$T_j$= 25°C A | $R_{th(j-s)}$ total K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Standard recovery - 1 phase** | | | | | | | | | | |
| **SKB 25** | 100-1600 | 17 | 75 | 370 | 2.2 | 150 | 2.15 | -40 ... +150 | G 10b |  |
| **Standard recovery - 3 phase** | | | | | | | | | | |
| **SKD 25** | 200-1600 | 20 | 73 | 370 | 2.2 | 150 | 1.9 | -40 ... +150 | G 11b |  |

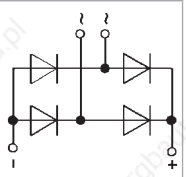
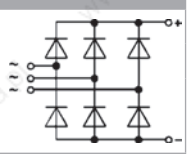
## Cases

**G 10b, G 11b**



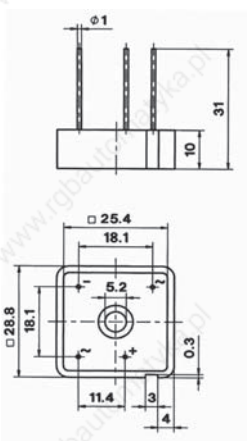

Dimensions in mm

# Modules - Miniature Bridge - Leaded

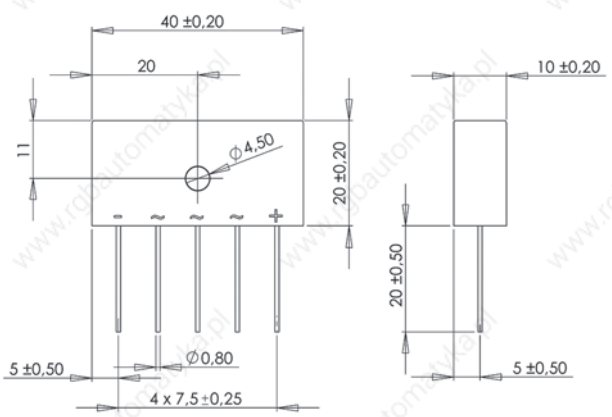
| Type | $V_{RRM}$ $V_{DRM}$ V | $I_D$ @$T_C$ A | $T_C$ °C | $I_{FSM}$ @$T_j$= 25°C A | $V_F$ @ $I_F$ $T_j$= 25°C V | $I_F$ @$T_j$= 25°C A | $R_{th(j-a)}$ total K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Standard recovery - 1 phase** | | | | | | | | | | |
| **SKB 26** | 200-1600 | 18 | 75 | 370 | 2.2 | 150 | 15 | -40 ... +150 | G 50a |  |
| **Standard recovery - 3 phase** | | | | | | | | | | |
| **DBI 6** | 200-1600 | 9 | 90 | 180 | 1.2 | 10 | 22 | -40 ... +150 | DBI |  |
| **DBI 15** | 200-1600 | 15 | 75 | 250 | 1.7 | 50 | 21 | -40 ... +150 | DBI | |
| **DBI 25** | 200-1600 | 25 | 32 | 370 | 1.05 | 12.5 | 21 | -40 ... +150 | DBI | |

## Cases

### G 50a




### DBI




**Dimensions in mm**

# Discretes

## Discrete Diode

### Leaded

1A 30A

### Surface mount

1A 5A

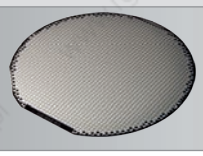
### Stud screw fit

5A 400A

### Capsule

4000A 6000A

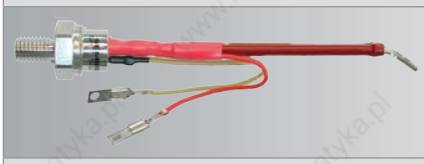
### Chip



5A 6000A

## Discrete Thyristor

### Stud screw fit

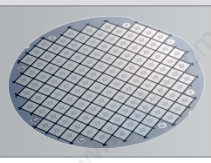


10A 300A

### Capsule

240A 2400A

### Chip



35A 1200A

[A] 1 5 10 30 35 240 300 400 1200 2400 4000 6000

# Discretes - Diodes - Leaded

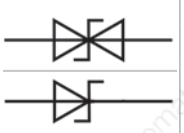
| Type | $V_{RRM}$ V | $I_{FAV}$ @$T_A$ A | $T_A$ °C | $I_{FSM}$ @$T_A$= 25°C A | $V_F$ @ $I_F$ $T_j$= 25°C V | $I_F$–$V_F$ A | $I_R$ @$T_j$= 25°C mA | $R_{th(j-L)}$ K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Standard recovery** | | | | | | | | | | | |
| **SK 1** | 1000-1600 | 1.45 | 60 | 60 | 1.50 | 10 | 0.4 | 85 | -40 ... +150 | E33 | |
| **SKN 2,5** | 400-1600 | 2.5 | 45 | 180 | 1.20 | 10 | 1.5 | 55 | -40 ... +180 | E5 | |
| **SK 3** | 1000-1600 | 3.3 | 85 | 180 | 1.20 | 10 | 0.6 | 60 | -40 ... +150 | E34 | |
| **SKN 5** | 200-1600 | 5 | 45 | 190 | 1.25 | 15 | 2.2 | 25 | -40 ... +180 | E6 | |
| **P 600 A ... P 600 S** | 50-1200 | 6 | 50 | 400 | 1.00 | 5 | 0.025 | 3.5 | -50 ... +175 | 8 x 7,5 | |
| **P 1000 A ... P 1000 S** | 50-1200 | 10 | 50 | 400 | 0.90 | 5 | 0.025 | 3 | -50 ... +175 | 8 x 7,5 | |
| **P 1200 A ... P 1200 S** | 50-1200 | 12 | 50 | 600 | 0.84-0.88 | 5 | 0.025 | 2.5 | -50 ... +175 | 8 x 7,5 | |
| **P 1500 ATL ... P 1500 STL** | 50-1200 | 15 | 50 | 600 | 0.84-0.88 | 5 | 0.025 | 1.8 | -50 ... +175 | 8 x 7,5 TL | |
| **P 2000 A ... P 2000 M** | 50-1000 | 20 | 50 | 650 | 0.85-0.87 | 5 | 0.025 | 1 | -50 ... +175 | 8 x 7,5 | |
| **P 2500 ATL ... P 2500 MTL** | 50-1000 | 25 | 50 | 650 | 0.85-0.87 | 5 | 0.025 | 0.7 | -50 ... +175 | 8 x 7,8 TL | |

| Type | $V_{RRM}$ V | $t_{rr}$ ns | $I_{FAV}$ @$T_A$ A | $T_A$ °C | $I_{FSM}$ @$T_A$= 25°C A | $V_F$ @ $I_F$ $T_j$= 25°C V | $I_F$–$V_F$ A | $I_R$ @$T_j$= 25°C mA | $R_{th(j-L)}$ K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Fast recovery** | | | | | | | | | | | | |
| **MR 820 ... MR 828** | 50-800 | 300 | 5 | 50 | 300 | 1.20 | 5 | 0.025 | 20 | -50 ... +150 | 8 x 7,5 | |
| **HE 12FA ... HE 12FG** | 50-400 | 200 | 12 | 50 | 650 | 0.82 | 5 | 0.025 | 2.5 | -50 ... +175 | 8 x 7,5 | |
| **HE 15FATL ... HE 15FGTL** | 50-400 | 200 | 15 | 50 | 700 | 0.82-0.84 | 5 | 0.025 | 1.8 | -50 ... +175 | 8 x 7,5 TL | |
| **HE 20FA ... HE 20FG** | 50-400 | 200 | 20 | 50 | 700 | 0.82-0.84 | 5 | 0.025 | 1.5 | -50 ... +175 | 8 x 7,5 | |
| **HE 25FATL ... HE 25FGTL** | 50-400 | 200 | 25 | 50 | 700 | 0.82-0.84 | 5 | 0.025 | 1 | -50 ... +175 | 8 x 7,8 TL | |
| **Ultrafast recovery** | | | | | | | | | | | | |
| **UF 600A ... UF 600M** | 50-1000 | 75-100 | 6 | 50 | 270 | 1.0-1.7 | 5 | 0.025 | 20 | -50 ... +150 | 8 x 7,5 | |

| Type | $V_{(BR)min.}$ V | $I_{FAV}$ @$T_A$ A | $T_A$ °C | $I_{FSM}$ @$T_A$= 25°C A | $V_F$ @ $I_F$ $T_j$= 25°C V | $I_F$–$V_F$ A | $R_{th(j-L)}$ K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Avalanche** | | | | | | | | | | |
| **SKa1** | 1300-1700 | 1.45 | 60 | 60 | 1.50 | 10 | 85 | -40 ... +150 | E33 | |
| **SKNa2** | 1300-1700 | 2 | 45 | 180 | 1.20 | 10 | 55 | -40 ... +150 | E5 | |
| **SKa3** | 1300-1700 | 3.3 | 90 | 180 | 1.20 | 10 | 60 | -40 ... +150 | E34 | |
| **SKNa4** | 1300-1700 | 3.7 | 35 | 190 | 1.20 | 10 | 25 | -40 ... +150 | E6 | |

# Discretes - Diodes - Leaded

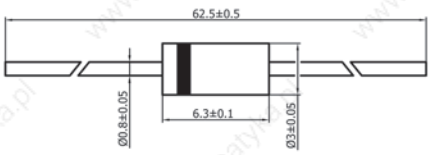
| Type | $V_{RRM}$ V | $I_{FAV}$ @$T_A$ A | $T_A$ °C | $I_{FSM}$ @$T_A$= 25°C A | $V_F$ @ $I_F$ $T_j$= 25°C V | $I_F$–$V_F$ A | $I_R$ @$T_j$= 25°C mA | $R_{th(j-L)}$ K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Schottky** | | | | | | | | | | | |
| **1N 5817 ... 1N 5819** | 20-40 | 1 | 50 | 40 | 0.75-0.9 | 3 | 1 | 45 | -50 ... +150 | DO-15 | |
| **SB 120 ... SB 1100** | 20-100 | 1 | 50 | 40 | 0.5-0.79 | 1 | 0.5 | 45 | -50 ... +150 | DO-15 | |
| **SB 220 ... SB 2100** | 20-100 | 2 | 50 | 50 | 0.5-0.79 | 2 | 0.5 | 45 | -50 ... +150 | DO-15 | |
| **1N 5820 ... 1N 5822** | 20-40 | 3 | 50 | 100 | 0.85-0.95 | 9 | 2 | 25 | -50 ... +150 | DO-201 | |
| **SB 320 ... SB 3100** | 20-100 | 3 | 50 | 100 | 0.5-0.79 | 3 | 0.5 | 25 | -50 ... +150 | DO-201 | |
| **SB 520 ... SB 5100** | 20-100 | 5 | 50 | 150 | 0.55-0.79 | 5 | 0.5 | 25 | -50 ... +150 | DO-201 | |
| **SB 820 ... SB 845** | 20-45 | 8 | 50 | 200 | 0.49 | 5 | 0.4 | 5 | -50 ... +150 | 5,4 x 7,5 | |
| **SB 1220 ... SB 1245** | 20-45 | 12 | 50 | 280 | 0.45-0.48 | 5 | 0.5 | 4 | -50 ... +150 | 5,4 x 7,5 | |
| **SB 1520 ... SB 1545** | 20-45 | 15 | 50 | 320 | 0.43 | 5 | 0.5 | 3 | -50 ... +150 | 8 x 7,5 | |
| **SB 1520S ... SB 1540S** | 20-40 | 15 | 50 | 320 | 0.43 | 5 | 0.5 | 4 | -50 ... +150 | 5,4 x 7,5 | |
| **SB 1520TL ... SB 1540TL** | 20-40 | 15 | 50 | 350 | 0.43 | 5 | 0.5 | 1.8 | -50 ... +150 | 8 x 7,5 TL | |
| **SB 2020TL ... SB 2040TL** | 20-40 | 20 | 50 | 550 | 0.39 | 5 | 0.5 | 1.8 | -50 ... +150 | 8 x 7,5 TL | |
| **SB2020 ... SB2040** | 20-40 | 20 | 50 | 550 | 0.39 | 5 | 0.5 | 2.5 | -50 ... +150 | 8 x 7,5 | |
| **SB 2520 ... SB 2540** | 20-40 | 25 | 50 | 700 | 0.38 | 5 | 0.6 | 2.5 | -50 ... +150 | 8 x 7,5 | |
| **SB 3020 ... SB 3040** | 20-40 | 30 | 50 | 700 | 0.37 | 5 | 0.6 | 2.5 | -50 ... +150 | 8 x 7,5 | |
| **SB 3020TL ... SB 3040TL** | 20-40 | 30 | 50 | 700 | 0.37 | 5 | 0.6 | 1.7 | -50 ... +150 | 8 x 7,5 TL | |
| **High Temperature Schottky** | | | | | | | | | | | |
| **SBH 820 ... SBH 845** | 20-45 | 8 | 50 | 180 | 0.53 | 5 | 0.04 | 5 | -50 ... +200 | 5,4 x 7,5 | |
| **SBH 1220 ... SBH 1245** | 20-45 | 12 | 50 | 280 | 0.51 | 5 | 0.05 | 4 | -50 ... +200 | 5,4 x 7,5 | |
| **SBH 1520 ... SBH 1545** | 20-45 | 15 | 50 | 350 | 0.48 | 5 | 0.05 | 3 | -50 ... +185 | 8 x 7,5 | |
| **SBH 1520S ... SBH 1545S** | 20-45 | 15 | 50 | 350 | 0.48 | 5 | 0.05 | 4 | -50 ... +185 | 5,4 x 7,5 | |
| **SBH 2020 ... SBH 2045** | 20-45 | 20 | 75 | 400 | 0.45 | 5 | 0.065 | 3.2 | -50 ... +185 | 8 x 7,8 | |
| **SBH 2020TL ... SBH 2045TL** | 20-45 | 20 | 50 | 650 | 0.45 | 5 | 0.065 | 1.8 | -50 ... +185 | 8 x 7,5 TL | |
| **SBH 2520 ... SBH 2540** | 20-40 | 25 | 50 | 700 | 0.45 | 5 | 0.1 | 2.5 | -50 ... +175 | 8 x 7,5 | |
| **SBH 3020 ... SBH 3045** | 20-45 | 30 | 50 | 700 | 0.43 | 5 | 0.15 | 2.5 | -50 ... +175 | 8 x 7,5 | |
| **SBH 3020TL ... SBH 3045TL** | 20-45 | 30 | 50 | 700 | 0.43 | 5 | 0.15 | 1.7 | -50 ... +175 | 8 x 7,5 TL | |

| Type | $V_{WM}$ V | $I_D$ @$T_A$ mA | $P_{PPM}$ @$T_A$ W | $T_A$ °C | $I_{FSM}$ @$T_A$= 25°C A | $V_{BR}$ @$I_T$ V | $I_{T_VBR}$ mA | $R_{th(j-L)}$ K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Transient voltage supressor** | | | | | | | | | | | |
| **1.5 KE6.8 ... 1.5 KE440CA** | 5,5-376 | 0.005 | 1500 | 25 | 200 | 6.12-462 | 1-10 | 8 | -50 ... +175 | 5,4 x 7,5 | |
| **5 KP6.5 ... 5 KP110CA** | 6,5-110 | 0.005 | 5000 | 25 | 400 | 7.22-140.5 | 5-50 | 4 | -50 ... +175 | 8 x 7,5 | |
| **BZW 04-5V8 ... BZW 04-376B** | 5,8-376 | 0.005 | 400 | 25 | 40 | 6.45-462 | 1-10 | 15 | -50 ... +175 | DO-15 |  |
| **BZW 06-5V8 ... BZW 06-376B** | 5,8-376 | 0.005 | 600 | 25 | 100 | 6.45-462 | 1-10 | 15 | -50 ... +175 | DO-15 | |
| **P4 KE6,8 ... P4 KE440CA** | 5.5-376 | 0.005 | 400 | 25 | 40 | 6.12-462 | 1-10 | 15 | -50 ... +175 | DO-15 | |
| **P6KE6,8...P6KE440CA, P6KE520C** | 5,5-423 | 0.005 | 600 | 25 | 100 | 6.12-570 | 1-10 | 15 | -50 ... +175 | DO-15 | |

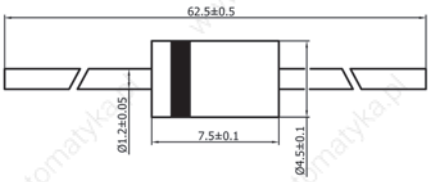
# Discretes - Diodes - Leaded

## Cases

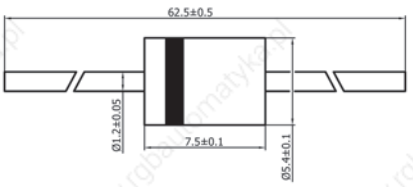
### DO-15



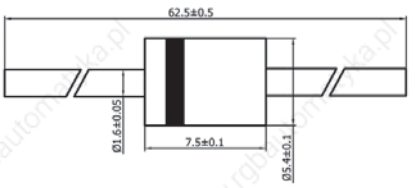

### DO-201



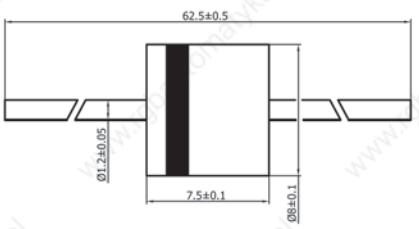

### Ø 5,4 x 7,5



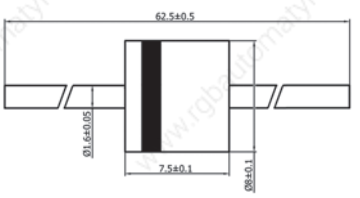

### Ø 5,4 x 7,5 TL



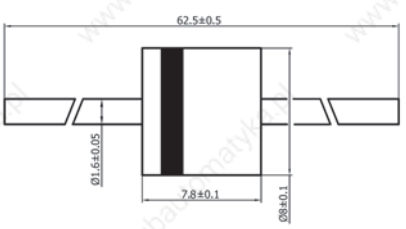

### Ø 8 x 7,5



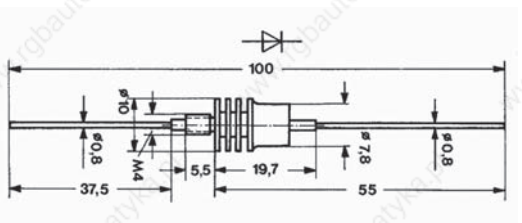

### Ø 8 x 7,5 TL



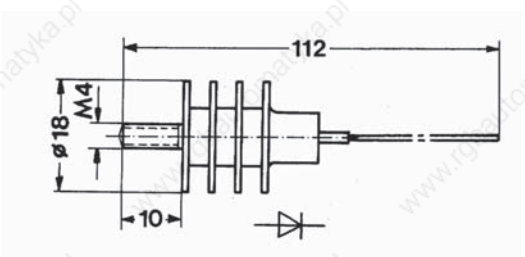

### Ø 8 x 7,8 TL



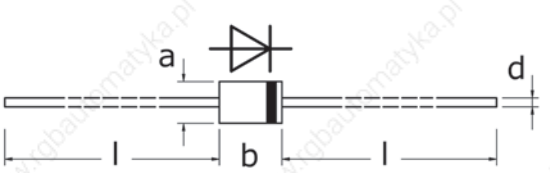

### E5




### E6




### E33 / E34




| Cases | a | b | l | d |
|---|---|---|---|---|
| E 33 | 4,5 | 7 | 28 | 0,75 |
| E 34 | 6 | 9 | 27 | 1,18 |

Dimensions in mm

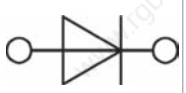
# Discretes - Diodes - Surface Mount

| Type | $V_{RRM}$ V | $I_{FAV}$ @$T_T$ A | $T_T$ °C | $I_{FSM}$ @$T_A$= 25°C A | $V_F$ @ $I_F$ $T_j$= 25°C V | $I_{F-}V_F$ A | $I_R$ @$T_j$= 25°C mA | $R_{th(j-a)}$ K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Standard recovery** | | | | | | | | | | | |
| **S1 A ... S1 M** | 50-1000 | 1 | 100 | 30 | 1.10 | 1 | 0.005 | 30 | -50 ... +150 | SMA | |
| **S1 T ... S1 Y** | 1300-2000 | 1 | 100 | 30 | 1.10 | 1 | 0.005 | 30 | -50 ... +150 | SMA | |
| **SM 4001 ... SM 4007** | 50-1000 | 1 | 75 | 40 | 1.10 | 1 | 0.005 | 10 | -50 ... +175 | MELF | |
| **SM 513, SM 516, SM 518, SM 2000** | 1300-2000 | 1 | 75 | 40 | 1.10 | 1 | 0.005 | 10 | -50 ... +175 | MELF | |
| **S2 A ... S2 M** | 50-1000 | 2 | 100 | 50 | 1.15 | 2 | 0.005 | 15 | -50 ... +150 | SMB | |
| **S2 SMA A ... S2 SMA M** | 50-1000 | 2 | 80 | 50 | 1.15 | 2 | 0.005 | 30 | -50 ... +150 | SMA | |
| **S2 T ... S2 Y** | 1300-2000 | 2 | 100 | 50 | 1.15 | 2 | 0.005 | 15 | -50 ... +150 | SMB | |
| **SM 5059 ... SM 5063** | 200-1000 | 2 | 50 | 50 | 1.10 | 2 | 0.005 | 10 | -50 ... +175 | MELF | |
| **S3 A ... S3 M** | 50-1000 | 3 | 100 | 100 | 1.15 | 3 | 0.005 | 10 | -50 ... +150 | SMC | |
| **S3 SMB A ... S3 SMB M** | 50-1000 | 3 | 90 | 100 | 1.15 | 3 | 0.005 | 15 | -50 ... +150 | SMB | |
| **S3 T ... S3 Y** | 1300-2000 | 3 | 100 | 100 | 1.15 | 3 | 0.005 | 10 | -50 ... +150 | SMC | |
| **SM 5400 ... SM 5408** | 50-1000 | 3 | 50 | 70 | 1.20 | 3 | 0.01 | 10 | -50 ... +175 | MELF | |
| **S5 A ... S5 M** | 50-1000 | 5 | 100 | 225 | 1.15 | 5 | 0.01 | 15 | -50 ... +150 | SMC | |

| Type | $V_{RRM}$ V | $t_{rr}$ ns | $I_{FAV}$ @$T_T$ A | $T_T$ °C | $I_{FSM}$ @$T_A$= 25°C A | $V_F$ @ $I_F$ $T_j$= 25°C V | $I_{F-}V_F$ A | $I_R$ @$T_j$= 25°C mA | $R_{th(j-a)}$ K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Fast recovery** | | | | | | | | | | | | |
| **FR 1A ... FR 1M** | 50-1000 | 150-500 | 1 | 100 | 30 | 1.30 | 1 | 0.005 | 30 | -50 ... +150 | SMA | |
| **FR1T ... FR1Y** | 1300-2000 | 500 | 1 | 100 | 20 | 1.80 | 1 | 0.01 | 30 | -50 ... +150 | SMA | |
| **SA 154 ... SA 160** | 50-1000 | 300 | 1 | 100 | 35 | 1.30 | 1 | 0.005 | 15 | -50 ... +175 | MELF | |
| **FR 2A ... FR 2M** | 50-1000 | 150-500 | 2 | 100 | 50 | 1.30 | 2 | 0.005 | 15 | -50 ... +150 | SMB | |
| **FR2 SMA A...FR2 SMA M** | 50-1000 | 150-500 | 2 | 65 | 50 | 1.30 | 2 | 0.005 | 30 | -50 ... +150 | SMA | |
| **FR2T ... FR2Y** | 1300-2000 | 500 | 2 | 100 | 50 | 1.80 | 2 | 0.01 | 15 | -50 ... +150 | SMB | |
| **SA 261 ... SA 265** | 1200-2000 | 500 | 2 | 100 | 50 | 1.80 | 2 | 0.005 | 15 | -50 ... +175 | MELF | |
| **FR 3 SMB A ... FR 3 SMB M** | 50-1000 | 150-500 | 3 | 80 | 100 | 1.30 | 3 | 0.005 | 15 | -50 ... +150 | SMB | |
| **FR 3A ... FR 3M** | 50-1000 | 150-500 | 3 | 100 | 100 | 1.30 | 3 | 0.005 | 10 | -50 ... +150 | SMC | |
| **FR3T ... FR3Y** | 1300-2000 | 500 | 3 | 100 | 100 | 1.80 | 3 | 0.01 | 10 | -50 ... +150 | SMC | |
| **FR 5A ... FR 5M** | 50-1000 | 150-500 | 5 | 70 | 175 | 1.30 | 5 | 0.005 | 10 | -50... +150 | SMC | |

| Type | $V_{RRM}$ V | $t_{rr}$ ns | $I_{FAV}$ @$T_T$ A | $T_T$ °C | $I_{FSM}$ @$T_A$= 25°C A | $V_F$ @ $I_F$ $T_j$= 25°C V | $I_{F-}V_F$ A | $I_R$ @$T_j$= 25°C mA | $R_{th(j-a)}$ K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ultrafast recovery** | | | | | | | | | | | | |
| **SUF 4001 ... SUF 4007-1200** | 50-1200 | 50-75 | 1 | 50 | 27 | 1-1.7 | 1 | 0.01 | 10 | -50 ... +175 | MELF | |
| **US 1A ... US 1S** | 50-1200 | 50-75 | 1 | 100 | 30 | 1-1.7 | 1 | 0.01 | 30 | -50 ... +150 | SMA | |
| **US 2A ... US 2S** | 50-1200 | 50-75 | 2 | 100 | 50 | 1-1.7 | 2 | 0.01 | 15 | -50 ... +150 | SMB | |
| **US 2SMA A ... US 2SMA M** | 50-1000 | 50-75 | 2 | 50 | 50 | 1-1.7 | 2 | 0.01 | 30 | -50 ... +150 | SMA | |
| **US 3SMB A ... US 3SMB M** | 50-1000 | 50-75 | 2.5 | 70 | 70 | 1-1.7 | 2.5 | 0.01 | 15 | -50 ... +150 | SMB | |
| **US 3A ... US 3S** | 50-1200 | 50-75 | 3 | 100 | 100 | 1-1.7 | 3 | 0.01 | 10 | -50 ... +150 | SMC | |

# Discretes - Diodes - Surface Mount

| Type | $V_{(BR)min.}$ | $t_{rr}$ | $I_{FAV}$ @$T_T$ | $T_T$ | $I_{FSM}$ @$T_A$= 25°C | $V_F$ @ $I_F$ $T_j$= 25°C | $I_F$–$V_F$ | $I_R$ @$T_j$= 25°C | $R_{th(j-a)}$ | $T_j$ | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | V | ns | A | °C | A | V | A | mA | K/W | °C | | |
| **Avalanche** | | | | | | | | | | | | |
| **FRA 1A ... FRA 1M** | 50-1000 | 150-500 | 1 | 100 | 30 | 1,3 | 1 | 0.003 | 30 | -50 ... +150 | SMA | |
| **SA 1A ... SA 1M** | 50-1000 | - | 1 | 100 | 30 | 1,1 | 1 | 0.001 | 30 | -50 ... +150 | SMA | |
| **SAA 154 ... SAA 160** | 50-1000 | 300 | 1 | 100 | 35 | 1,3 | 1 | 0.015 | 15 | -50 ... +175 | MELF | |
| **SAM 4001 ... SAM 4007** | 50-1000 | - | 1 | 75 | 40 | 1,1 | 1 | 0.015 | 10 | -50 ... +175 | MELF | |
| **SUFA4001 ... SUFA4007** | 50-1000 | 50-75 | 1 | 50 | 27 | 1-1,7 | 1 | 0.005 | 10 | -50 ... +175 | MELF | |
| **USA 1A ... USA 1M** | 50-1000 | 50-75 | 1 | 90 | 30 | 1-1,7 | 1 | 0.005 | 30 | -50 ... +150 | SMA |  |
| **FRA 2A ... FRA 2M** | 50-1000 | 150-500 | 2 | 100 | 50 | 1,3 | 2 | 0.003 | 15 | -50 ... +150 | SMB | |
| **SA 2A ... SA 2 M** | 50-1000 | - | 2 | 100 | 50 | 1,15 | 2 | 0.0015 | 15 | -50 ... +150 | SMB | |
| **USA 2A ... USA 2M** | 50-1000 | 50-75 | 2 | 90 | 50 | 1-1,7 | 2 | 0.01 | 15 | -50 ... +150 | SMB | |
| **FRA 3A ... FRA 3M** | 50-1000 | 150-500 | 3 | 100 | 100 | 1,3 | 3 | 0.003 | 10 | -50 ... +150 | SMC | |
| **SA 3A ... SA 3M** | 50-1000 | - | 3 | 100 | 100 | 1,15 | 3 | 0.0015 | 10 | -50 ... +150 | SMC | |
| **USA 3A ... USA 3M** | 50-1000 | 50-75 | 3 | 90 | 100 | 1-1,7 | 3 | 0.01 | 10 | -50 ... +150 | SMC | |

| Type | $V_{RRM}$ | $I_{FAV}$ @$T_T$ | $T_T$ | $I_{FSM}$ @$T_A$= 25°C | $V_F$ @ $I_F$ $T_j$= 25°C | $I_F$–$V_F$ | $I_R$ @$T_j$= 25°C | $R_{th(j-a)}$ | $T_j$ | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | V | A | °C | A | V | A | mA | K/W | °C | | |
| **Schottky** | | | | | | | | | | | |
| **SK 12 ... SK 110** | 20-100 | 1 | 100 | 30 | 0.5-0.85 | 1 | 0.5 | 30 | -50 ... +150 | SMA | |
| **SM 5817 ... SM 5819** | 20-40 | 1 | 100 | 30 | 0.75-0.9 | 3 | 1 | 10 | -50 ... +150 | MELF | |
| **SMS 120 ... SMS 1100** | 20-100 | 1 | 100 | 30 | 0.5-0.79 | 1 | 0.5 | 10 | -50 ... +150 | MELF | |
| **SK 22 ... SK 210** | 20-100 | 2 | 100 | 50 | 0.5-0.85 | 2 | 0.5 | 15 | -50 ... +150 | SMB | |
| **SMS 220 ... SMS 2100** | 20-100 | 2 | 100 | 50 | 0.5-0.79 | 2 | 0.5 | 10 | -50 ... +150 | MELF | |
| **SK 32 ... SK 310** | 20-100 | 3 | 100 | 100 | 0.5-0.85 | 3 | 0.5 | 10 | -50 ... +150 | SMC | |

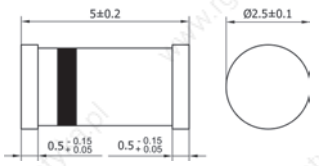
| Type | $V_{WM}$ | $I_D$ @$T_A$ | $P_{PPM}$ @$T_A$ | $T_A$ | $I_{FSM}$ @$T_A$= 25°C | $V_{BR}$ @$I_T$ | $I_{T_VBR}$ | $R_{th(j-a)}$ | $T_j$ | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | V | A | W | °C | A | V | mA | K/W | °C | | |
| **Transient voltage supressor** | | | | | | | | | | | |
| **1,5 SMCJ 6,5 ... 1,5 SMCJ 180CA** | 6,5-150 | 0.000005 | 1500 | 25 | 100 | 7,2-231 | 1-10 | 10 | -50 ... +150 | SMC | |
| **P4 SMAJ 6,5 ... P4 SMAJ 180CA** | 6,5-130 | 0.000005 | 400 | 25 | 40 | 7,2-231 | 1-10 | 30 | -50 ... +150 | SMA | |
| **P6 SMBJ 6,5 ... P6 SMBJ 180CA** | 6,5-130 | 0.000005 | 600 | 25 | 100 | 7,2-231 | 1-10 | 15 | -50 ... +150 | SMB | |
| **TGL 41-520C** | 423 | 0.000005 | 400 | 25 | 40 | 470-570 | 1 | 10 | -50 ... +150 | MELF | |
| **SDA 2AK, SDA 4AK** | 0,5-1 | 0.001 | 300 | 25 | - | 0,8-2 | 1000 | 0 | -50 ... +150 | MELF | |
| **TGL 41-6,8 ... TGL 41-400CA** | 5,5-342 | 0.001 | 400 | 25 | 40 | 6,12-420 | 1-10 | 10 | -50 ... +150 | MELF | |

| Type | $V_Z$ @$I_{ZT}$ | $I_{ZT}$ @$T_A$ | $P_{tot}$ @$T_A$ | $T_A$ | $V_R$ @ $I_R$ $T_j$= 25°C | $I_R$–$V_R$ | $R_{th(j-a)}$ | $T_j$ | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|
| | V | A | W | °C | V | µA | K/W | °C | | |
| **Zener** | | | | | | | | | | |
| **ZMY 1 ... ZMY 200 (1,3W)** | 0,71-212 | 0.0025 | 1.3 | 50 | 1,5-90 | 0,5-1 | 10 | -50 ... +150 | MELF | |
| **SMZ 1 ... SMZ 200 (2W)** | 0,71-212 | 0.005 | 2 | 50 | 1,5-90 | 1 | 10 | -50 ... +150 | MELF | |
| **SZ3C 1 ... SZ3C 200 (3W)** | 0,71-212 | 0.005 | 3 | 50 | 1,5-90 | 1 | 10 | -50 ... +150 | MELF | |
| **Z1 SMA 1 ... Z1 SMA 100 (1W)** | 0,71-106 | 0.005 | 1 | 50 | 1,5-75 | 1 | 30 | -50 ... +150 | SMA | |
| **Z2 SMB 1 ... Z2 SMB 200 (2W)** | 0,71-212 | 0.005 | 2 | 50 | 1,5-90 | 1 | 15 | -50 ... +150 | SMB | |
| **Z3 SMC 1 ... Z3 SMC 200 (3W)** | 0,71-212 | 0.005 | 3 | 50 | 1,5-90 | 1 | 10 | -50 ... +150 | SMC | |

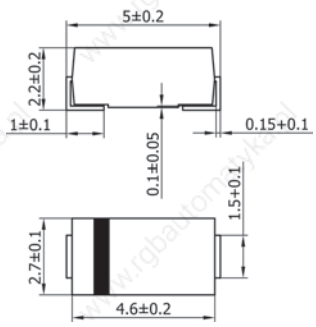
# Discretes - Diodes - Surface Mount

## Cases

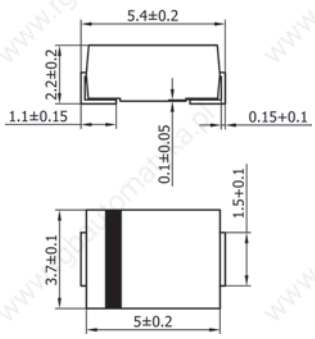
### MELF



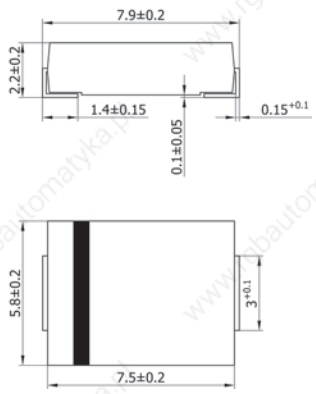

### SMA




### SMB



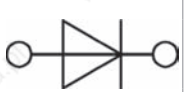
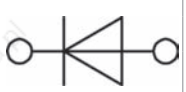

### SMC



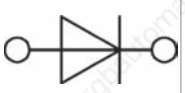

**Dimensions in mm**

# Discretes - Diodes - Stud Screw Fit

| Type | $V_{RRM}$ V | $I_{FAV}$ @$T_C$ A | $T_C$ °C | $I_{FSM}$ @$T_j$= 25°C A | $V_F$ @ $I_F$ $T_j$= 25°C V | $I_F$—$V_F$ A | $R_{th(j-c)}$ K/W | $T_j$ °C | also available with UNF-thread | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Standard recovery** | | | | | | | | | | | |
| **SKN 20** | 400-1600 | 20 | 125 | 375 | 1.55 | 60 | 2 | -40 ... +180 | yes | E9 | |
| **SKN 26** | 400-1600 | 25 | 100 | 375 | 1.55 | 60 | 2 | -40 ... +180 | yes | E8 | |
| **SKN 45** | 400-1600 | 45 | 125 | 700 | 1.60 | 150 | 0.85 | -40 ... +180 | yes | E12 | |
| **SKN 70** | 400-1600 | 70 | 125 | 1150 | 1.50 | 200 | 0.55 | -40 ... +180 | yes | E12 | |
| **SKN 71** | 400-1600 | 70 | 125 | 1150 | 1.50 | 200 | 0.55 | -40 ... +180 | yes | E11 | |
| **SKN 100** | 400-1800 | 100 | 120 | 1750 | 1.55 | 400 | 0.45 | -40 ... +180 | yes | E13 | |
| **SKN 130** | 400-1800 | 130 | 125 | 2500 | 1.50 | 500 | 0.35 | -40 ... +180 | yes | E14 | |
| **SKN 240** | 400-1800 | 240 | 125 | 6000 | 1.40 | 750 | 0.2 | -40 ... +180 | yes | E15 | |
| **SKN 320** | 400-1600 | 320 | 125 | 9000 | 1.35 | 1000 | 0.16 | -40 ... +180 | yes | E16 | |
| **SKN 400** | 1800-3000 | 400 | 100 | 9000 | 1.45 | 1200 | 0.11 | -40 ... +160 | yes | E17 | |
| **SKR 20** | 400-1600 | 20 | 125 | 375 | 1.55 | 60 | 2 | -40 ... +180 | yes | E9 | |
| **SKR 26** | 400-1600 | 25 | 100 | 375 | 1.55 | 60 | 2 | -40 ... +180 | yes | E8 | |
| **SKR 45** | 400-1600 | 45 | 125 | 700 | 1.60 | 150 | 0.85 | -40 ... +180 | yes | E12 | |
| **SKR 70** | 400-1600 | 70 | 125 | 1150 | 1.50 | 200 | 0.55 | -40 ... +180 | yes | E12 | |
| **SKR 71** | 400-1600 | 70 | 125 | 1150 | 1.50 | 200 | 0.55 | -40 ... +180 | yes | E11 | |
| **SKR 100** | 400-1800 | 100 | 120 | 1750 | 1.55 | 400 | 0.45 | -40 ... +180 | yes | E13 | |
| **SKR 130** | 400-1800 | 130 | 125 | 2500 | 1.50 | 500 | 0.35 | -40 ... +180 | yes | E14 | |
| **SKR 240** | 400-1800 | 240 | 125 | 6000 | 1.40 | 750 | 0.2 | -40 ... +180 | yes | E15 | |
| **SKR 320** | 400-1600 | 320 | 125 | 9000 | 1.35 | 1000 | 0.16 | -40 ... +180 | yes | E16 | |

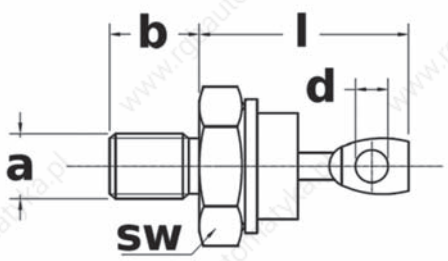
| Type | $V_{RRM}$ V | $t_{rr}$ ns | $I_{FAV}$ @$T_C$ A | $T_C$ °C | $I_{FSM}$ @$T_j$= 25°C A | $V_F$ @ $I_F$ $T_j$= 25°C V | $I_F$—$V_F$ A | $R_{th(j-c)}$ K/W | $T_j$ °C | also available with UNF-thread | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Fast recovery** | | | | | | | | | | | | |
| **SKN 2F17** | 400-1000 | 440 | 17 | 113 | 450 | 2.15 | 50 | 1.2 | -40 ... +150 | yes | E7 | |
| **SKN 3F20** | 800-1200 | 600 | 20 | 104 | 375 | 2.15 | 50 | 1.2 | -40 ... +150 | yes | E7 | |
| **SKN 2F50** | 400-1000 | 600 | 50 | 105 | 1100 | 1.80 | 50 | 0.5 | -40 ... +150 | yes | E10 | |
| **SKN 60F** | 1200-1700 | 2100 | 60 | 100 | 1400 | 1.75 | 150 | 0.5 | -40 ... +150 | yes | E10 | |
| **SKN 135F** | 800-1200 | 1900 | 135 | 100 | 2500 | 1.95 | 300 | 0.2 | -40 ... +150 | yes | E14 |  |
| **SKN 136F** | 800-1200 | 1900 | 135 | 100 | 2500 | 1.95 | 300 | 0.2 | -40 ... +150 | yes | E31 | |
| **SKN 140F** | 1200-1700 | 2000 | 140 | 100 | 2500 | 1.80 | 300 | 0.2 | -40 ... +150 | yes | E14 | |
| **SKN 141F** | 1200-1700 | 2000 | 140 | 100 | 2500 | 1.80 | 300 | 0.2 | -40 ... +150 | yes | E31 | |
| **SKR 2F17** | 400-1000 | 440 | 17 | 113 | 450 | 2.15 | 50 | 1.2 | -40 ... +150 | yes | E7 | |
| **SKR 3F20** | 800-1200 | 600 | 20 | 104 | 375 | 2.15 | 50 | 1.2 | -40 ... +150 | yes | E7 | |
| **SKR 2F50** | 400-1000 | 600 | 50 | 95 | 800 | 1.80 | 50 | 0.65 | -40 ... +150 | yes | E10 | |
| **SKR 60F** | 1200-1700 | 2100 | 60 | 100 | 1400 | 1.75 | 150 | 0.5 | -40 ... +150 | yes | E10 | |
| **SKR 135F** | 800-1200 | 1900 | 135 | 100 | 2500 | 1.95 | 300 | 0.2 | -40 ... +150 | yes | E14 |  |
| **SKR 136F** | 800-1200 | 1900 | 135 | 100 | 2500 | 1.95 | 300 | 0.2 | -40 ... +150 | yes | E31 | |
| **SKR 140F** | 1200-1700 | 2000 | 140 | 100 | 2500 | 1.80 | 300 | 0.2 | -40 ... +150 | yes | E14 | |
| **SKR 141F** | 1200-1700 | 2000 | 140 | 100 | 2500 | 1.80 | 300 | 0.2 | -40 ... +150 | yes | E31 | |

# Discretes - Diodes - Stud Screw Fit

| Type | $V_{RRM}$ V | $I_{FAV}$ @$T_C$ A | $T_C$ °C | $I_{FSM}$ @$T_j$= 25°C A | $V_F$ @ $I_F$ $T_j$= 25°C V | $I_F$—$V_F$ A | $R_{th(j-c)}$ K/W | $T_j$ °C | also available with UNF-thread | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Avalanche** | | | | | | | | | | | |
| **SKNa 20** | 1300-1700 | 20 | 93 | 375 | 1.55 | 60 | 2 | -40 ... +150 | no | E9 |  |
| **SKNa 22** | 3600-5000 | 25 | 104 | 450 | 1.95 | 60 | 1 | -40 ... +160 | no | E42 | |
| **SKNa 47** | 3600-5000 | 45 | 106 | 700 | 1.80 | 100 | 0.6 | -40 ... +160 | no | E43 | |
| **SKNa 102** | 3600-5000 | 125 | 80 | 1900 | 1.90 | 300 | 0.3 | -40 ... +160 | no | E44 | |
| **SKNa 202** | 3600-5000 | 200 | 80 | 3800 | 1.95 | 600 | 0.2 | -40 ... +160 | no | E45 | |
| **SKNa 402** | 3600-5000 | 400 | 88 | 7800 | 1.85 | 1200 | 0.1 | -40 ... +160 | no | E46 | |

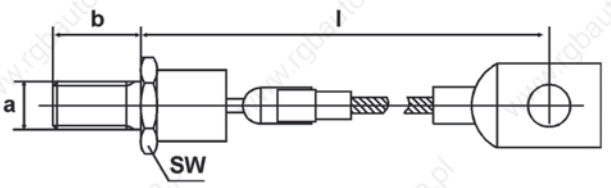
## Cases

### E7 / E8 / E10 / E11 / E31



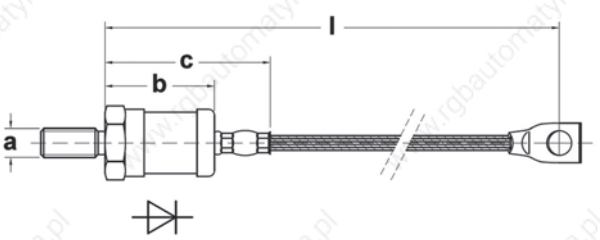

| Cases | a | b | d | l | sw |
|---|---|---|---|---|---|
| E 7 | M 5 | 11 | 2,7 | 22 | 11 |
| E 8 | M 6 | 11 | 2,7 | 21,5 | 11 |
| E 10 | M 6 | 11 | 4 | 25 | 17 |
| E 11 | M 8 | 11 | 4 | 25,5 | 17 |
| E 31 | M 12 | 18 | 8,4 | 55 | 24 |

### E9 / E12 ... E17




| Cases | a | b | l | SW |
|---|---|---|---|---|
| E 9 | M 6 | 11 | 130 | 11 |
| E 12 | M 8 | 11 | 135 | 17 |
| E 13 | M 12 | 18 | 165 | 24 |
| E 14 | M 12 | 18 | 165 | 24 |
| E 15 | M 16 x 1,5 | 20 | 190 | 32 |
| E 16, E 17 | M 24 x 1,5 | 20 | 230 | 41 |

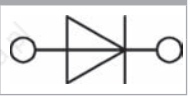
### E 42 / E 43 / E 44 / E 45 / E 46




| Cases | a | b | c | l |
|---|---|---|---|---|
| E 42 | M 6 | 28.5 | 45 | 150 |
| E 43 | M 8 | 32 | 54 | 160 |
| E 44 | M 12 | 38 | 57 | 185 |
| E 45 | M 16 x 1,5 | 48 | 70 | 205 |
| E 46 | M 24 x 1,5 | 54 | 82 | 250 |

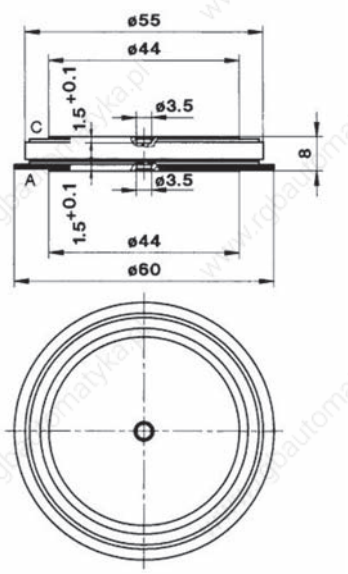
**Dimensions in mm**

# Discretes - Diodes - Capsule

| Type | $V_{RRM}$ V | $I_{FAV}$ @$T_C$ A | $T_C$ °C | $I_{FSM}$ @$T_j$= 25°C A | $V_F$ @ $I_F$ $T_j$= 25°C V | $I_F$–$V_F$ A | $R_{th(j-c)}$ per chip K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|
| **SKN 4000** | 200-600 | 4000 | 50 | 60000 | 1.30 | 14000 | 0.03 | -40 ... +180 | E35 |  |
| **SKN 6000** | 200-600 | 6000 | 85 | 60000 | 1.30 | 14000 | 0.012 | -40 ... +180 | E35 | |

## Cases

**E35**



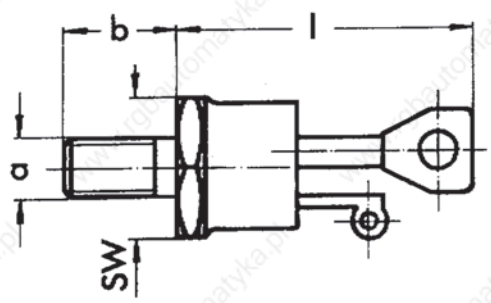

**Dimensions in mm**

# Discretes - Thyristor - Stud Screw Fit

| Type | $V_{RRM}$ $V_{DRM}$ V | $I_{TAV}$ @$T_C$ A | $T_C$ °C | $I_{TSM}$ @$T_j$= 25°C A | $V_T$ @ $I_T$ $T_j$= 25°C V | $I_T$–$V_T$ A | $R_{th(j-c)}$ @sin. 180° K/W | $T_j$ °C | also available with UNF-thread | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SKT 10** | 600-1200 | 10 | 111 | 250 | 1.6 | 30 | 1.3 | -40 ... +130 | no | B1 | |
| **SKT 16** | 400-1800 | 16 | 104 | 370 | 2.4 | 75 | 0.9 | -40 ... +130 | yes | B2 | |
| **SKT 24** | 400-1800 | 24 | 95 | 450 | 1.9 | 75 | 0.9 | -40 ... +130 | yes | B2 | |
| **SKT 40** | 400-1800 | 40 | 80 | 700 | 1.95 | 120 | 0.66 | -40 ... +130 | no | B3 | |
| **SKT 50** | 600-1800 | 50 | 78 | 1050 | 1.8 | 120 | 0.6 | -40 ... +130 | yes | B3 | |
| **SKT 55** | 400-1800 | 55 | 92 | 1300 | 1.8 | 200 | 0.47 | -40 ... +130 | no | B5 | |
| **SKT 80** | 600-1800 | 80 | 85 | 1700 | 2.25 | 300 | 0.28 | -40 ... +130 | yes | B5 | |
| **SKT 100** | 400-1800 | 100 | 85 | 2000 | 1.75 | 300 | 0.28 | -40 ... +130 | yes | B5 | |
| **SKT 130** | 400-1600 | 130 | 85 | 3500 | 2.25 | 500 | 0.18 | -40 ... +130 | no | B6 | |
| **SKT 160** | 400-1600 | 160 | 84 | 4300 | 1.75 | 500 | 0.18 | -40 ... +130 | yes | B6 | |
| **SKT 250** | 400-1600 | 250 | 85 | 7000 | 1.65 | 800 | 0.123 | -40 ... +130 | no | B7 | |
| **SKT 300** | 400-1600 | 300 | 93 | 11000 | 1.45 | 800 | 0.096 | -40 ... +130 | yes | B7 | |

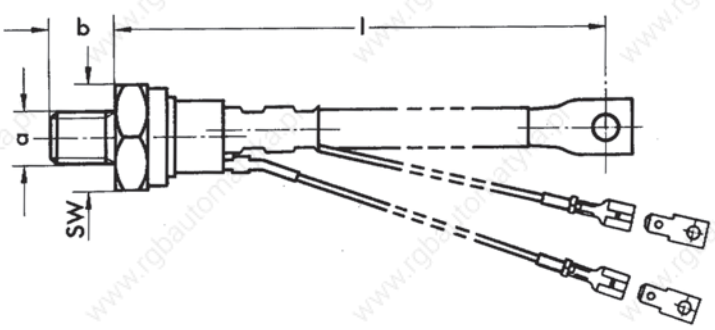
## Cases

### B1 ... B3




| Cases | a | b | l | SW |
|---|---|---|---|---|
| B 1 | M 5 | 11 | 20,3 | 11 |
| B 2 | M 6 | 11 | 30 | 14 |
| B 3 | M 8 | 11 | 33,5 | 17 |

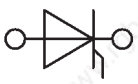
### B5 ... B7




| Cases | a | b | l | SW |
|---|---|---|---|---|
| B 5 | M 12 | 18 | 160 | 24 |
| B 6 | M 16 x 1,5 | 20 | 190 | 32 |
| B 7 | M 24 x 1,5 | 20 | 230 | 41 |

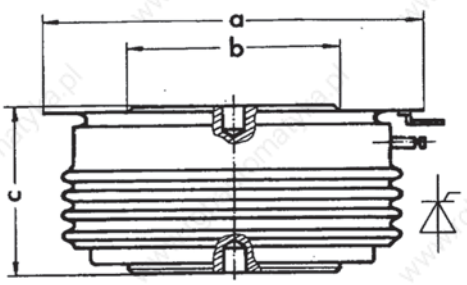
Dimensions in mm

# Discretes - Thyristor - Capsule

| Type | $V_{RRM}$ $V_{DRM}$ V | $I_{TAV}$ @$T_C$ A | $T_C$ °C | $I_{TSM}$ @$T_j$= 25°C A | $V_T$ @ $I_T$ $T_j$= 25°C V | $I_T$–$V_T$ A | $R_{th(j-c)}$ @sin. 180° K/W | $T_j$ °C | Case | Circuit |
|---|---|---|---|---|---|---|---|---|---|---|
| **SKT 240** | 400-1800 | 240 | 93 | 5000 | 2.3 | 1000 | 0.072 | -40 ... +125 | B8 |  |
| **SKT 340** | 800-1800 | 340 | 82 | 5700 | 1.9 | 1000 | 0.072 | -40 ... +125 | B8 | |
| **SKT 491** | 400-1800 | 490 | 80 | 8000 | 2.1 | 1500 | 0.047 | -40 ... +125 | B11 | |
| **SKT 493** | 400-1800 | 490 | 80 | 8000 | 2.1 | 1500 | 0.047 | -40 ... +125 | B11a | |
| **SKT 551** | 800-1800 | 550 | 85 | 9000 | 1.65 | 1500 | 0.047 | -40 ... +125 | B11 | |
| **SKT 553** | 400-1800 | 550 | 85 | 9000 | 1.65 | 1500 | 0.047 | -40 ... +125 | B11a | |
| **SKT 600** | 800-1800 | 600 | 86 | 11500 | 2 | 2400 | 0.04 | -40 ... +125 | B10 | |
| **SKT 760** | 800-1800 | 760 | 80 | 15000 | 1.65 | 2400 | 0.04 | -40 ... +125 | B10 | |
| **SKT 1000** | 1200-1600 | 1000 | 85 | 19000 | 2 | 3600 | 0.022 | -40 ... +125 | B14 | |
| **SKT 1200** | 1200-1800 | 1200 | 85 | 30000 | 1.65 | 3600 | 0.022 | -40 ... +125 | B14 | |

## Cases

**B8 ... B20**




| Cases | a | b | c |
|---|---|---|---|
| B 8 | 41 | 19 | 14 |
| B 10 | 57,3 | 34 | 26 |
| B 11 | 41 | 25 | 14 |
| B 11a | 41 | 25 | 14 |
| B 14 | 73 | 47 | 26 |

**Dimensions in mm**

# Discretes - Chips - SEMICELL

| Type | $V_{RRM}$ | $I_F$ @$T_j$= 150°C | $I_{FSM}$ @$T_j$= 150°C 10ms | $V_F$ @$T_j$= 25°C | $I_F$ @ $V_F$ $T_j$= 25°C | $Q_{rr}$ @$T_j$= 125°C |
|---|---|---|---|---|---|---|
| | V | A | A | V | A | µC |
| **600 V - Freewheeling Diodes CAL I3 Fast** | | | | | | |
| SKCD 06 C 060 I3 | 600 | 15 | - | 1.35 | 10 | 0.7 |
| SKCD 09 C 060 I3 | 600 | 20 | 100 | 1.35 | 15 | 1.2 |
| SKCD 18 C 060 I3 | 600 | 30 | 200 | 1.35 | 25 | 2.5 |
| SKCD 31 C 060 I3 | 600 | 50 | 440 | 1.35 | 50 | 3.3 |
| SKCD 47 C 060 I3 | 600 | 80 | 720 | 1.35 | 85 | 5.5 |
| SKCD 61 C 060 I3 | 600 | 100 | 1000 | 1.35 | 110 | 7 |
| SKCD 81 C 060 I3 | 600 | 150 | 1260 | 1.35 | 155 | 8.5 |
| SKCD 121 C 060 I3 | 600 | 210 | 2100 | 1.35 | 245 | 10.7 |
| **1200 V - Freewheeling Diodes CAL I3 Fast** | | | | | | |
| SKCD 06 C 120 I3 | 1200 | 10 | - | 2.00 | 5 | - |
| SKCD 11 C 120 I3 | 1200 | 15 | - | 2.00 | 10 | - |
| SKCD 18 C 120 I3 | 1200 | 25 | 180 | 2.00 | 15 | 2.7 |
| SKCD 23 C 120 I3 | 1200 | 30 | 250 | 2.00 | 25 | 3.7 |
| SKCD 31 C 120 I3 | 1200 | 40 | 350 | 2.00 | 35 | 4.5 |
| SKCD 47 C 120 I3 | 1200 | 55 | 550 | 2.00 | 55 | 8 |
| SKCD 61 C 120 I3 | 1200 | 75 | 720 | 2.00 | 70 | 11 |
| SKCD 81 C 120 I3 | 1200 | 100 | 900 | 2.00 | 100 | 15 |
| SKCD 121 C 120 I3 | 1200 | 150 | - | 2.00 | 155 | - |
| **1700 V - Freewheeling Diodes CAL Fast** | | | | | | |
| SKCD 47 C 170 I | 1700 | 55 | 550 | 2.05 | 55 | 15 |
| SKCD 61 C 170 I | 1700 | 75 | 720 | 2.05 | 75 | 19 |

| Type | $V_{RRM}$ | $I_F$ @$T_j$= 175°C | $I_{FSM}$ @$T_j$= 150°C 10ms | $V_F$ @$T_j$= 25°C | $I_F$ @ $V_F$ $T_j$= 25°C | $E_{off}$ @$T_j$= 150°C |
|---|---|---|---|---|---|---|
| | V | A | A | V | A | mJ |
| **1200 V - Freewheeling Diodes CAL I4 Fast** | | | | | | |
| SKCD 08 C 120 I4F | 1200 | 8 | 36 | 2.33 | 8 | 0.4 |
| SKCD 11 C 120 I4F | 1200 | 15 | 65 | 2.38 | 15 | 0.6 |
| SKCD 16 C 120 I4F | 1200 | 25 | 100 | 2.41 | 25 | 1 |
| SKCD 22 C 120 I4F | 1200 | 35 | 170 | 2.30 | 35 | 1.6 |
| SKCD 31 C 120 I4F | 1200 | 50 | 270 | 2.22 | 50 | 2.6 |
| SKCD 46 C 120 I4F | 1200 | 75 | 430 | 2.17 | 75 | 4.2 |
| SKCD 46 C 120 I4F R | 1200 | 75 | 430 | 2.17 | 75 | 4.2 |
| SKCD 53 C 120 I4F | 1200 | 100 | 550 | 2.20 | 100 | 5.4 |
| SKCD 81 C 120 I4F | 1200 | 150 | 900 | 2.14 | 150 | 8.7 |

# Discretes - Chips - SEMICELL

| Type | $V_{RRM}$ | $I_F$ @$T_j$= 175°C | $I_{FSM}$ @$T_j$= 150°C 10ms | $V_F$ @$T_j$= 25°C | $I_F$ @ $V_F$ $T_j$= 25°C | $Q_{rr}$ @$T_j$= 150°C |
|---|---|---|---|---|---|---|
| | V | A | A | V | A | µC |
| **600 V - Freewheeling Diodes CAL High Density** | | | | | | |
| **SKCD 04 C 060 I HD** | 600 | 10 | 65 | 1.35 | 7 | 0.89 |
| **SKCD 06 C 060 I HD** | 600 | 20 | 95 | 1.35 | 12 | 0.93 |
| **SKCD 09 C 060 I HD** | 600 | 30 | 160 | 1.35 | 19 | 1.6 |
| **SKCD 16 C 060 I HD** | 600 | 50 | 320 | 1.35 | 37 | 5.64 |
| **SKCD 24 C 060 I HD** | 600 | 75 | 395 | 1.35 | 60 | 7.8 |
| **SKCD 42 C 060 I HD** | 600 | 100 | 810 | 1.35 | 110 | 14 |
| **SKCD 61 C 060 I HD** | 600 | 150 | 1080 | 1.35 | 160 | 22 |
| **SKCD 81 C 060 I HD** | 600 | 200 | 1310 | 1.35 | 230 | 32 |

| Type | $V_{RRM}$ | $I_F$ @$T_j$= 150°C | $I_{FSM}$ @$T_j$= 150°C 10ms | $V_F$ @$T_j$= 25°C | $I_F$ @ $V_F$ $T_j$= 25°C | $Q_{rr}$ @$T_j$= 125°C |
|---|---|---|---|---|---|---|
| | V | A | A | V | A | µC |
| **1200 V - Freewheeling Diodes CAL High Density** | | | | | | |
| **SKCD 06 C 120 I HD** | 1200 | 6 | 55 | 1.50 | 5 | 1.4 |
| **SKCD 11 C 120 I HD** | 1200 | 15 | 125 | 1.50 | 12 | 3.3 |
| **SKCD 14 C 120 I HD** | 1200 | 20 | 170 | 1.50 | 15 | 4.2 |
| **SKCD 18 C 120 I HD** | 1200 | 25 | 200 | 1.50 | 20 | 5 |
| **SKCD 31 C 120 I HD** | 1200 | 55 | 480 | 1.50 | 45 | 10 |
| **SKCD 47 C 120 I HD** | 1200 | 85 | 640 | 1.50 | 70 | 12 |
| **SKCD 61 C 120 I HD** | 1200 | 115 | 900 | 1.50 | 90 | 18 |
| **SKCD 81 C 120 I HD** | 1200 | 160 | 1100 | 1.50 | 130 | 23 |
| **1700 V - Freewheeling Diodes CAL High Density** | | | | | | |
| **SKCD 47 C 170 I HD** | 1700 | 75 | 650 | 1.73 | 75 | 19 |
| **SKCD 61 C 170 I HD** | 1700 | 100 | 710 | 1.73 | 100 | 26 |
| **SKCD 81 C 170 I HD** | 1700 | 150 | 1070 | 1.73 | 150 | 44 |

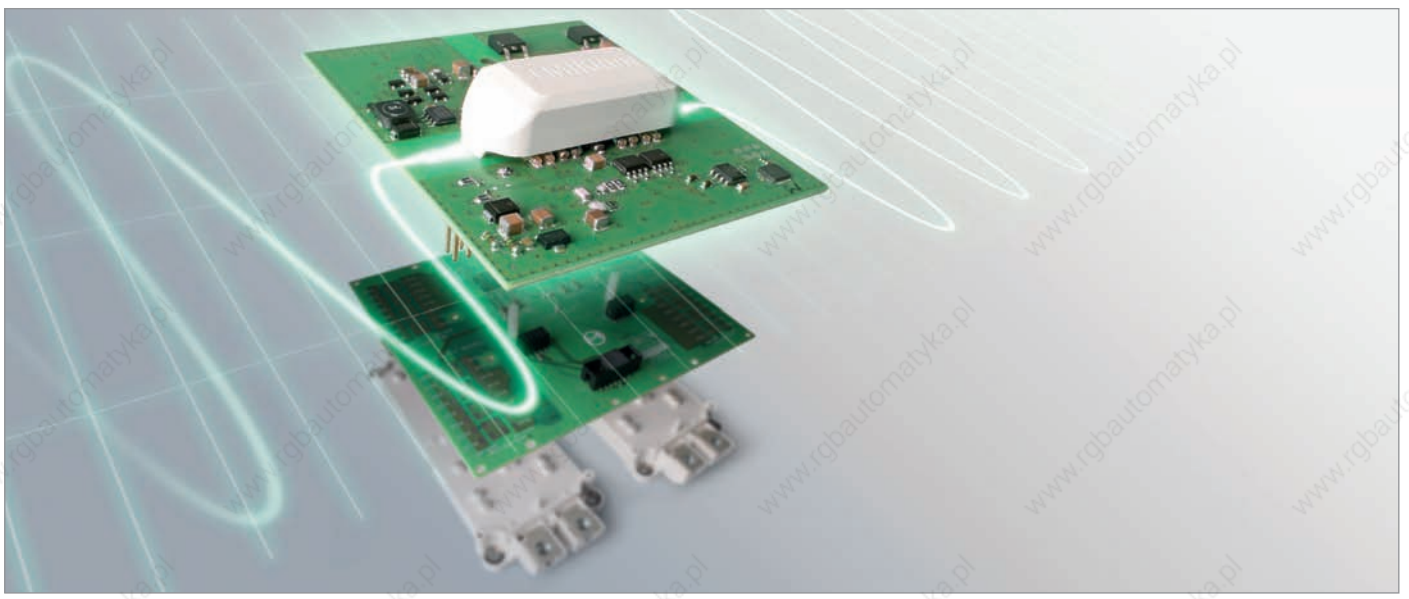
# Discretes - Chips - SEMICELL

| Type | solderable | $V_{RRM}$ V | $I_{F(DC)}$ @$T_j$= 150°C A | $I_{FSM}$ @$T_j$= 150°C 10ms A | $V_F$ @$T_j$= 25°C V | $I_F$ @ $V_F$ $T_j$= 25°C A | $t_{rr}$ @$T_j$= 25°C 10ms µs |
|---|---|---|---|---|---|---|---|
| **1600 V - Rectifier** | | | | | | | |
| **SKR 3,5 Qu bond** | on request | 1600 | 25 | 200 | 1 | 8 | 20 |
| **SKR 4,2 Qu bond** | on request | 1600 | 35 | 270 | 1 | 13 | 20 |
| **SKR 4,8 Qu bond** | yes | 1600 | 45 | 350 | 1 | 18 | 21 |
| **SKR 5,6 Qu bond** | on request | 1600 | 50 | 490 | 1 | 25 | 22 |
| **SKR 6,2 Qu bond** | yes | 1600 | 65 | 600 | 1 | 33 | 22 |
| **SKR 7,0 Qu bond** | on request | 1600 | 75 | 890 | 1 | 45 | 23 |
| **SKR 8,9 Qu bond** | yes | 1600 | 140 | 1380 | 1 | 77 | 26 |
| **SKR 10,3 Qu bond** | yes | 1600 | 170 | 1650 | 1 | 106 | 29 |
| **SKR 12,4 Qu bond** | yes | 1600 | 235 | 2300 | 1 | 160 | 34 |
| **SKR 15,2 Qu bond** | on request | 1600 | 330 | 3800 | 1 | 245 | 42 |
| **SKR 16,3 x 18,2 Qu bond** | on request | 1600 | 365 | 5100 | 1 | 320 | 49 |
| **SKR 18,2 Qu bond** | on request | 1600 | 380 | 5500 | 1 | 360 | 53 |
| **SKR 22,4 Qu bond** | on request | 1600 | 770 | 9450 | 1 | 550 | 72 |

| Type | solderable | $V_{RRM}$ $V_{DRM}$ V | $I_{T(DC)}$ @$T_C$=80°C, $T_j$=130°C A | $I_{TSM}$ @$T_j$= 130°C 10ms A | $V_{GT}$ @$T_j$= 25°C V | $I_{GT}$ @$T_j$= 25°C A | $t_q$ @$T_j$= 130°C 10ms µs |
|---|---|---|---|---|---|---|---|
| **1600 V - Thyristor Central Gate** | | | | | | | |
| **SKT 8,9 Qu ZG bond.** | on request | 1600 | 105 | 1000 | 1.98 | 100 | 150 |
| **SKT 10,3 Qu ZG bond.** | on request | 1600 | 125 | 1250 | 1.98 | 100 | 150 |
| **SKT 13,5 Qu ZG bond.** | on request | 1600 | 185 | 2300 | 1.98 | 100 | 135 |
| **SKT 15,2 Qu ZG bond.** | yes | 1600 | 215 | 3200 | 1.98 | 100 | 150 |
| **SKT 18,2 Qu ZG bond.** | on request | 1600 | 250 | 5000 | 1.98 | 100 | 150 |
| **SKT 24,3 Qu ZG bond.** | on request | 1600 | 480 | 8200 | 1.98 | 150 | 150 |
| **1600 V - Thyristor Corner Gate** | | | | | | | |
| **SKT 5,6 Qu RG bond.** | on request | 1600 | 60 | 280 | 1.98 | 100 | 150 |
| **SKT 7,0 Qu RG bond.** | on request | 1600 | 75 | 450 | 1.98 | 100 | 150 |
| **SKT 8,9 Qu RG bond.** | yes | 1600 | 105 | 1000 | 1.98 | 100 | 150 |
| **SKT 10,3 Qu RG bond.** | on request | 1600 | 125 | 1250 | 1.98 | 100 | 150 |
| **SKT 12,4 Qu RG bond.** | yes | 1600 | 165 | 1800 | 1.98 | 100 | 150 |

# SKYPER®

## Robust IGBT Driver



## Applications

SKYPER 32 is solid driving in x-ray devices, industrial drives and process control applications. SKYPER 42 meets the requirements of induction heating/ welding applications that call for high currents, durable solar inverters and variable industrial motor drives between 300 kW to 1.5 MW. The powerful SKYPER 52 is ideal for use in high-power applications such as wind turbines. SKYPER drivers are highly robust two-channel IGBT drivers used to control 50 - 9000 Amp IGBT modules. Boasting a mean time between failures of more than two million hours, the service life of this driver is triple that of standard IGBT drivers. SKYPER 32, 42 and 52 can drive 600 V, 1200 V and 1700 V IGBT modules.

## Product range

| | | |
|---|---|---|
| SKYPER 32 R UL/ 32 PRO R UL/ 32 R/ 32 PRO R: | 50 mA/ 15 A | 50 kHz |
| SKYPER42 R: | 150 mA/ 30 A | 100 kHz |
| SKYPER 52 R: | 300 mA/ 50 A | 100 kHz |

## Benefits

Robust driving technology

- Integrated power and signal transformer provide galvanic insulation
- Internal power supply
- Low coupling capacitance with 100 kV/dt ruggedness
- Steady stabilized gate voltage for safe switching characteristic
- Dynamic short-circuit protection, soft turn-off, dead-time generation and voltage monitoring
- EMC with unique interlayer connection and short-pulse suppression
- SKYPER 52 works as a digital driver, providing differential inputs, digital signal transmission and IntelliOff to rule out voltage spikes

Easy assembly with customized adaptor boards

- Adaptor boards for paralleling SEMiX 3S/ 4S modules, SKiM modules and wire-bonded modules like SEMITRANS
- Decoupled and symmetric gate control to reduce current and voltage peaks
- Assembly service for gate resistors and VCE components for adaptor boards on request

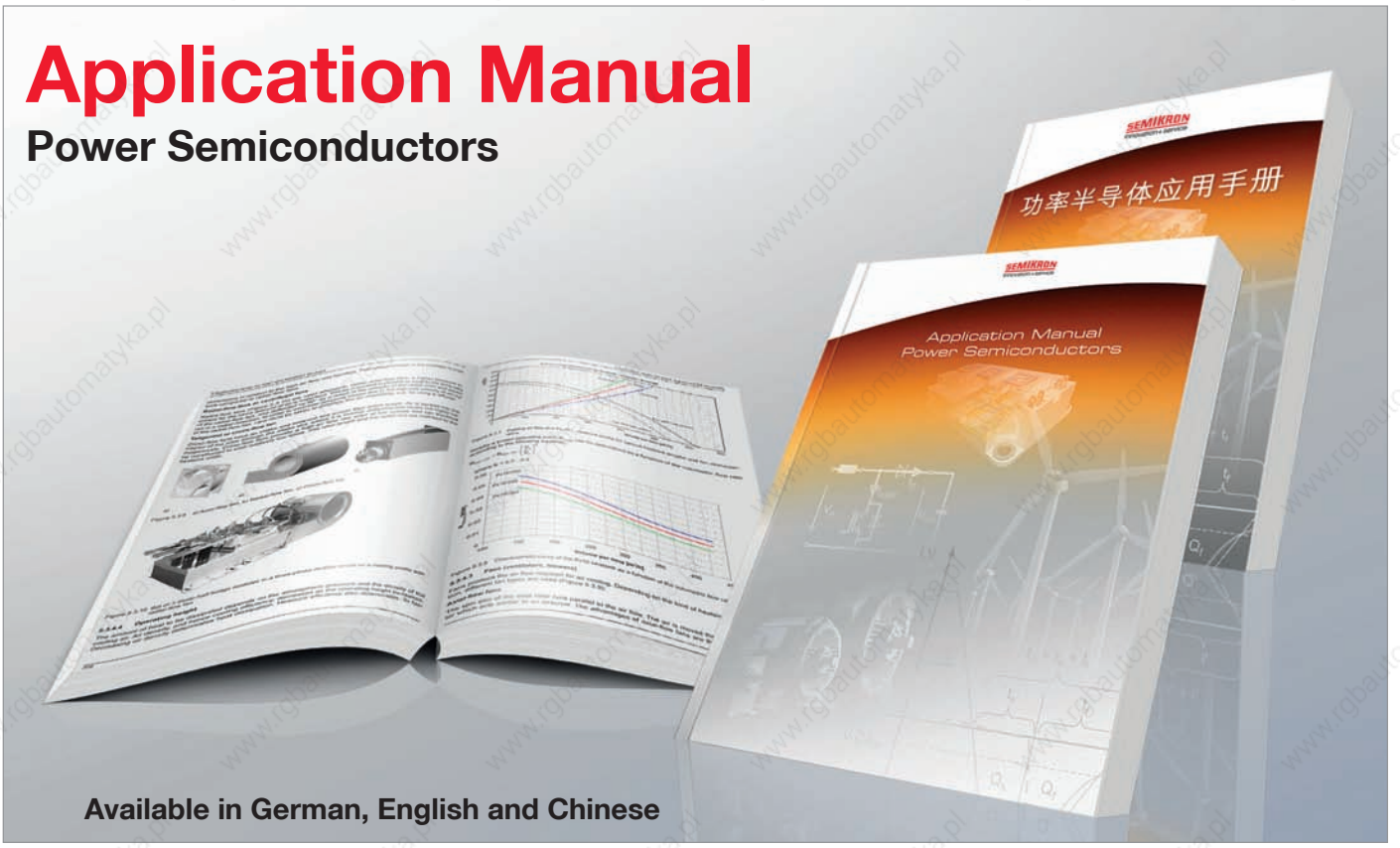
# Driver Electronics - SEMIDRIVER

| Type | Channels | $V_{CE}$ V | $V_{G(on)}$ V | $V_{G(off)}$ V | $I_{outPEAK}$ A | $Q_{out/pulse}$ µC | $f_{max}$ kHZ | $V_{isolIO}$ kV | dv/dt kV/µs |
|---|---|---|---|---|---|---|---|---|---|
| **Driver** | | | | | | | | | |
| **SKHI 10/12 R** | 1 | 1200 | 15 | -8 | 8 | 9.6 | 100 | 2500 | 75 |
| **SKHI 10/17 R** | 1 | 1700 | 15 | -8 | 8 | 9.6 | 100 | 4000 | 75 |
| **SKHI 23/12 R** | 2 | 1200 | 15 | -8 | 8 | 4.8 | 100 | 2500 | 75 |
| **SKHI 23/17 R** | 2 | 1700 | 15 | -8 | 8 | 4.8 | 100 | 4000 | 75 |
| **SKHIT 01 R** [1] | 3 | 528 | - | - | - | - | 10 | 2500 | - |
| **Driver Core** | | | | | | | | | |
| **SKHI 21A R** [2] | 2 | 1200 | 15 | 0 | 8 | 4 | 50 | 2500 | 50 |
| **SKHI 22 A/B H4 R** | 2 | 1700 | 15 | -7 | 8 | 4 | 50 | 4000 | 50 |
| **SKHI 22 A/B R** | 2 | 1200 | 15 | -7 | 8 | 4 | 50 | 2500 | 50 |
| **SKHI 24 R** | 2 | 1700 | 15 | -8 | 15 | 5 | 50 | 4000 | 50 |
| **SKYPER 32 PRO R** | 2 | 1700 | 15 | -7 | 15 | 6.3 | 50 | 4000 | 50 |
| **SKYPER 32 PRO R UL** | 2 | 1700 | 15 | -7 | 15 | 6.3 | 50 | 4000 | 50 |
| **SKYPER 32 R** | 2 | 1700 | 15 | -7 | 15 | 2.5 | 50 | 4000 | 50 |
| **SKYPER 32 R UL** | 2 | 1700 | 15 | -7 | 15 | 2.5 | 50 | 4000 | 50 |
| **SKYPER 42 R** | 2 | 1700 | 15 | -8 | 30 | 50 | 100 | 4000 | 100 |
| **SKYPER 52 R** | 2 | 1700 | 15 | -15 | 50 | 100 | 100 | 4000 | 100 |
| **SKHI 61 R** | 6 | 900 | 14.9 | -6.5 | 2 | 1 | 50 | 2500 | 15 |
| **SKHI 71 R** | 7 | 900 | 14.9 | -6.5 | 2 | 1 | 50 | 2500 | 15 |
| **Adaptor Board** | | | | | | | | | |
| **Board 1 SKYPER 32 R** | 2 | 1700 | 15 | -7 | 15 | 2.5 | 50 | 4000 | 50 |
| **Board 1 SKYPER 32PRO R** | 2 | 1700 | 15 | -7 | 15 | 6.3 | 50 | 4000 | 50 |
| **Board 2 // 4S SKYPER 42 R** | 2 | 1700 | 15 | -8 | 30 | 50 | 100 | 4000 | 100 |
| **Board 2 generic SKYPER 42 R** | 2 | 1700 | 15 | -8 | 30 | 50 | 100 | 4000 | 100 |
| **Board 2//3S SKYPER 42 R** | 2 | 1700 | 15 | -8 | 30 | 50 | 100 | 4000 | 100 |
| **Board 2s SKYPER 32 R** | 2 | 1700 | 15 | -7 | 15 | 2.5 | 50 | 4000 | 50 |
| **Board 2s SKYPER 32PRO R** | 2 | 1700 | 15 | -7 | 15 | 6.3 | 50 | 4000 | 50 |
| **Board 3s SKYPER 32 R** | 2 | 1700 | 15 | -7 | 15 | 2.5 | 50 | 4000 | 50 |
| **Board 3s SKYPER 32PRO R** | 2 | 1700 | 15 | -7 | 15 | 6.3 | 50 | 4000 | 50 |
| **Board 4s SKYPER 32 R** | 2 | 1700 | 15 | -7 | 15 | 2.5 | 50 | 4000 | 50 |
| **Board 4s SKYPER 32PRO R** | 2 | 1700 | 15 | -7 | 15 | 6.3 | 50 | 4000 | 50 |

**Footnotes**

[1] Thyristor Driver

[2] MOSFET Driver




## 465 pages of acquired knowledge

IGBT´s and MOSFET´s integrated in power modules are the key components of power electronic circuits today and are continuously finding their way into new fields of application. This goes hand in hand with the ever increasing call for line rectifier diodes and thyristors as a cost-effective way of connecting the circuits to the power grid. The aim of the application manual is to provide users with support in selecting and using such devices. The manual contains basic background knowledge on semiconductors in order to enable a better understanding of application possibilities and limits. More in-depth explanations are given on packaging and assembly technologies, because of the major influence they have on module properties and limitations in field applications. Statements on reliability data, life cycle analyses and key test processes round off the chapter. The application manual also explains the structure of datasheets and provides notes to help users better understand datasheet parameters.

The Application Manual contains detailed application-related information on electrical configuration under important operating conditions, driver and protection elements for semiconductors; thermal dimensioning and cooling, tips on parallel and series connection, assembly tips for optimized power layouts with regard to parasitic elements and the requirements arising from specific ambient conditions.

This book is written for users and provides help with component selection and design-in work. It couples a vast wealth of experience with detailed practical knowledge, the result being a vast pool of information which up till now has been spread across various individual articles or in the minds of experts only.

**Can be ordered at**
**www.sindopower.com**

# Spring integration
# Wire bond-free, solder-free, thermal paste-free

## Applications

SEMIKRON has successfully established its SKiN® packaging technology and is now combining it with spring-contact technology for even better results. These two systems are planned mainly in electric vehicle and wind turbine applications.

## Benefits

SKiN® technology is a flexible foil used in place of wire bonds. In combination with sinter technology, the SKiN® technology can help double inverter power density to 3 A/cm$^2$, leading to a 35 % reduction in inverter volume. This high power density requires space-saving and uncomplicated means of connecting the power components with the driver unit. The driver terminals thus use spring contacts affixed to the surface of the flexible foil. SEMIKRON looks back on ten years of experience with spring-contact technology, with more than 500 million SEMIKRON spring contacts in field applications today. The new connection technology also does away with thermal paste, using a sintered layer instead of thermal paste and soldered base plate. Thermal paste is responsible for around 30 % of the overall thermal resistance in an electronic system, which is why it is a key factor in the electric and thermal dimensioning of a power electronics system. With SKiN® technology, the thermal paste layer between the PCB and heat sink is replaced by a silver sinter layer, improving thermal conductivity between chip and heat sink by 35 %.

# Systems for e-vehicles

## SKAI® 2 IGBT

600V/1200V
300A

## SKAI® 2 MOSFET Single

100V/150V/200V
200A 400A

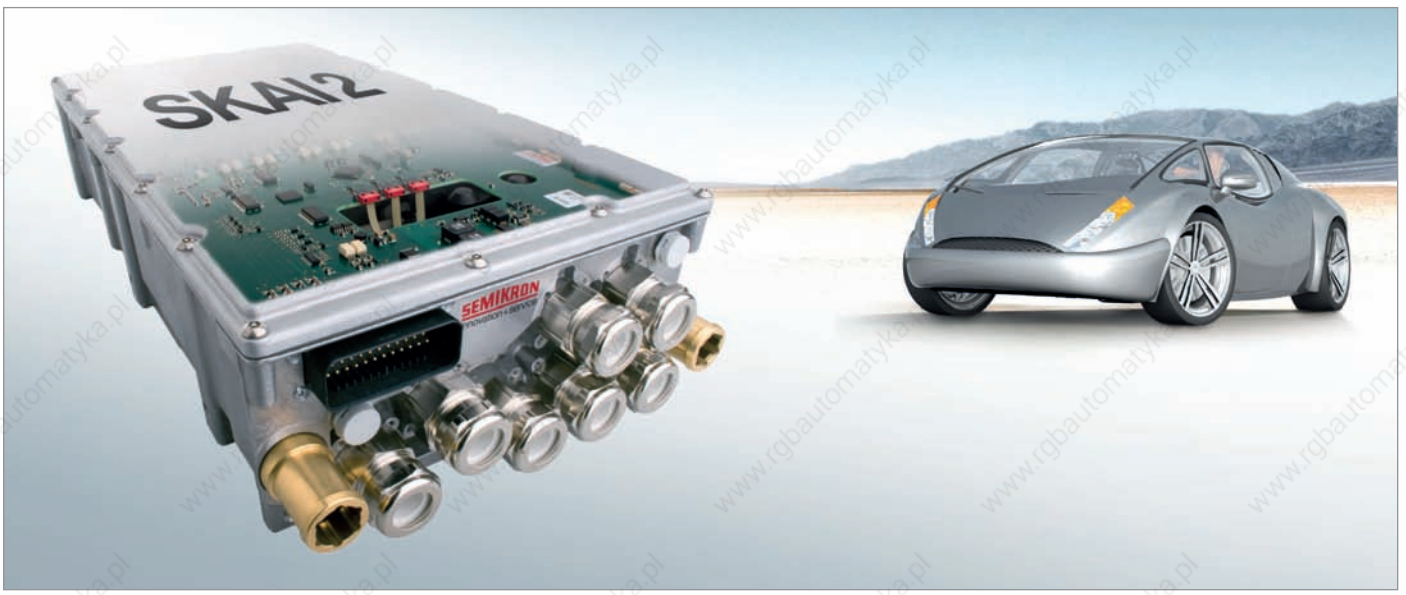
## SKAI® 2 MOSFET Dual

100V/150V/200V
150A 400A

$I_D$, $I_C$ [A] 150 200 300 400

# SKAI™ 2

## 3-phase inverter systems up to 250 kVA for electric vehicle applications




### Applications

SEMIKRON's SKAI2 product platform is predestined for use in automotive applications. The systems are designed to operate with battery voltages of 24 - 800 V, output power ratings of 10 - 250 kVA, and are developed in line with the latest automotive and system qualification standards. The standard systems are supplied with low-voltage MOSFETs or high-voltage IGBTs in single or dual configuration.

### Product range

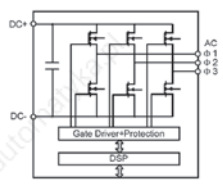
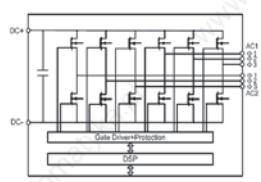
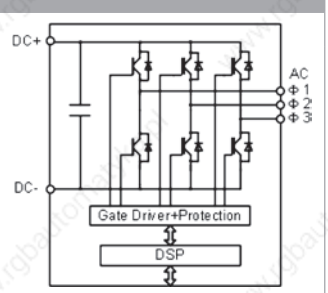
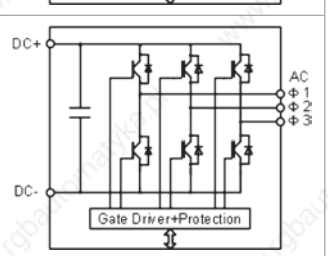
The IGBT-based SKAI2 is available as watercooled 3-phase inverter in voltage classes 600 V or 1200 V, with or without DSP, with an output power of up to 250 kVA. The MOSFET-based SKAI2 is available as forced-air cooled, water-cooled or baseplate type, in voltage classes 100 V, 150 V or 200 V, in single or dual 3-phase inverter topology with an output power of up to 55 kVA.

### Benefits

The high-voltage SKAI2 is available as a water-cooled 600 V or 1200 V IGBT-based 3-phase inverter system. It has been optimized for electrification of commercial vehicle drive trains. This system is based on the established, sintered, and 100 % solder-free power semiconductor technology for an output power of up to 250 kVA. It features a polypropylene film DC-link capacitor, driver electronics, a state of the art DSP controller, EMC filters, and sensors for current, voltage and temperature monitoring. All system components will be protected by a waterproof IP67 metal case against environmental impacts. The system can communicate with the vehicle master controller via CANbus.

The low-voltage SKAI2 MOSFET 3-phase inverter systems are available in different configurations regarding cooling, battery voltage and topology. It is mainly used in medium power electric vehicle applications with motor power of up to 55 kVA. They have extremely short bus-bar connections between the MOSFET dice and multicell DC bus capacitor, leading to low inductance in the commutation circuit. This results in a switching behavior with very low voltage overshoot. The utilization of maximum MOSFET drain-source voltage as well as power density is high. The inverter is integrated in a waterproof IP67 enclosure but with the cost-effective solution of leaving the power terminals open. Thermal and electrical contact of SKAI2 systems are based on SKiiP pressure-contact technology. This results in extended service life and high load cycling capability.

# Systems - SKAI2

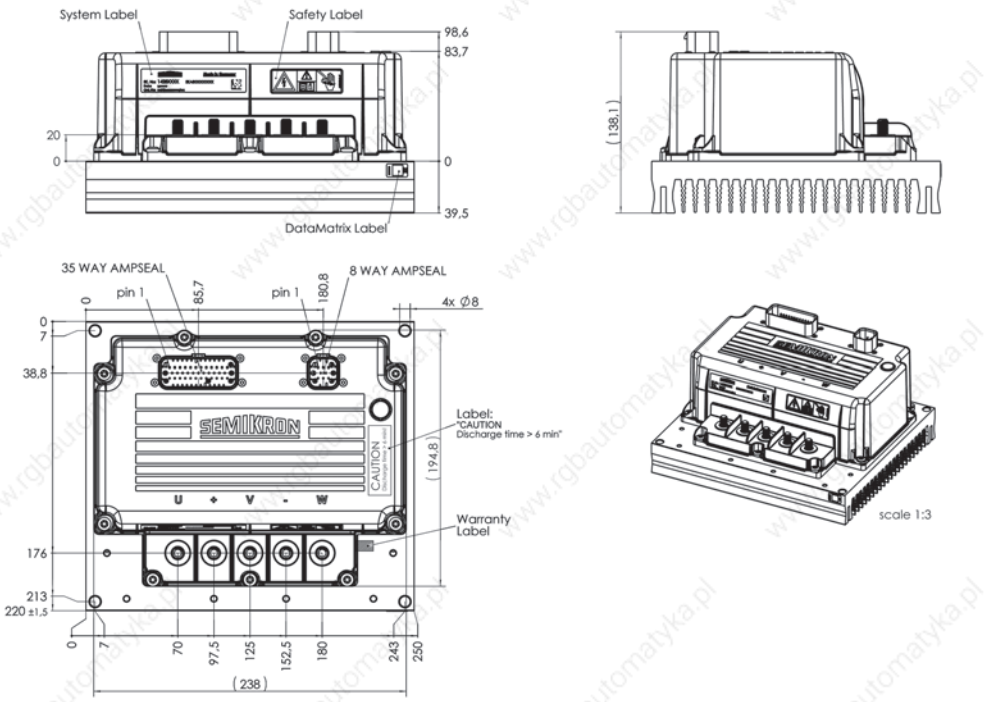
| Type | $V_{battery\ (max)}$ V | $I_{Cnom}$ A | Topology | Cooling | DSP | Case | Circuit |
|---|---|---|---|---|---|---|---|
| **MOSFET - Three-phase inverter** | | | | | | | |
| **SKAI 60 A2 MD10-L** [1] | 72 | 400 | 3-Phase | Forced Air | Yes | 1 |  |
| **SKAI 60 A2 MD10-P** [1] | 72 | 400 | 3-Phase | Baseplate | Yes | 3 | |
| **SKAI 70 A2 MD15-L** [1] | 115 | 350 | 3-Phase | Forced Air | Yes | 1 | |
| **SKAI 70 A2 MD15-W** [1] | 115 | 400 | 3-Phase | Liquid | Yes | 2 | |
| **SKAI 50 A2 MD20-L** [1] | 160 | 300 | 3-Phase | Forced Air | Yes | 1 | |
| **SKAI 50 A2 MD20-W** [1] | 160 | 350 | 3-Phase | Liquid | Yes | 2 | |
| **SKAI 60 A2 MM10-L** [1] | 72 | 250 | Dual 3-Phase | Forced Air | Yes | 4 |  |
| **SKAI 70 A2 MM15-L** [1] | 115 | 200 | Dual 3-Phase | Forced Air | Yes | 4 | |
| **SKAI 70 A2 MM15-P** [1] | 115 | 200 | Dual 3-Phase | Baseplate | Yes | 6 | |
| **SKAI 70 A2 MM15-W** [1] | 115 | 300 | Dual 3-Phase | Liquid | Yes | 5 | |
| **SKAI 50 A2 MM20-L** [1] | 160 | 150 | Dual 3-Phase | Forced Air | Yes | 4 | |
| **SKAI 50 A2 MM20-W** [1] | 160 | 250 | Dual 3-Phase | Liquid | Yes | 5 | |
| **IGBT - Three-phase inverter** | | | | | | | |
| **SKAI 90 A2 GD06-WCI** [1] | 450 | 300 | 3-Phase | Liquid | Yes | 7 |  |
| **SKAI 45 A2 GD12-WCI** [1] | 800 | 300 | 3-Phase | Liquid | Yes | 7 | |
| **SKAI 90 A2 GD06-WDI** [1] | 450 | 300 | 3-Phase | Liquid | No | 7 |  |
| **SKAI 45 A2 GD12-WDI** [1] | 800 | 300 | 3-Phase | Liquid | No | 7 | |

**footnotes**

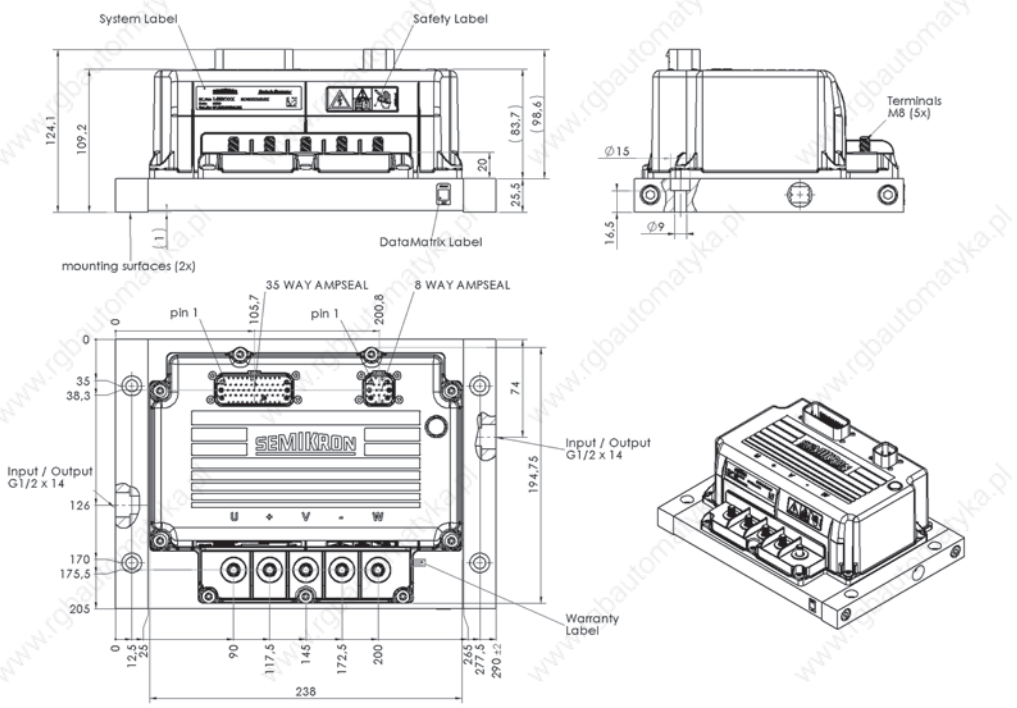
[1] New

## Cases

### Case 1



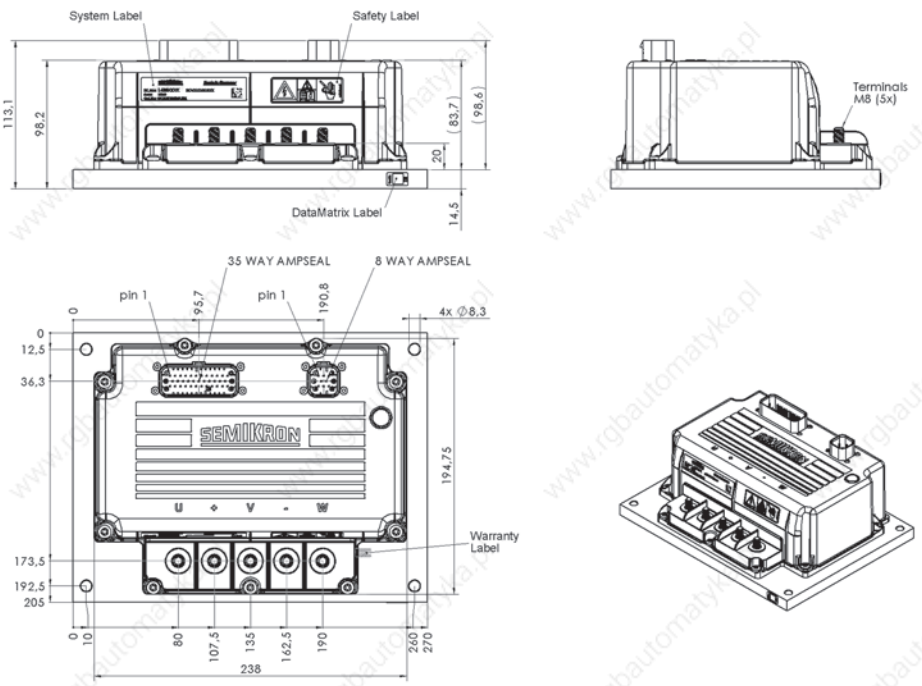

### Case 2



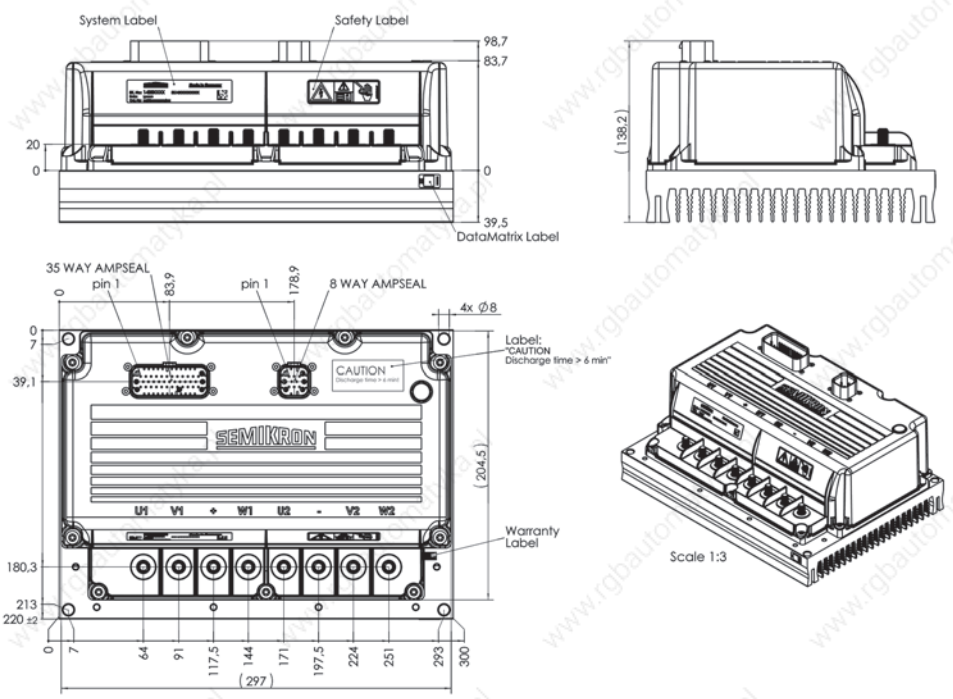

Dimensions in mm

## Cases

### Case 3



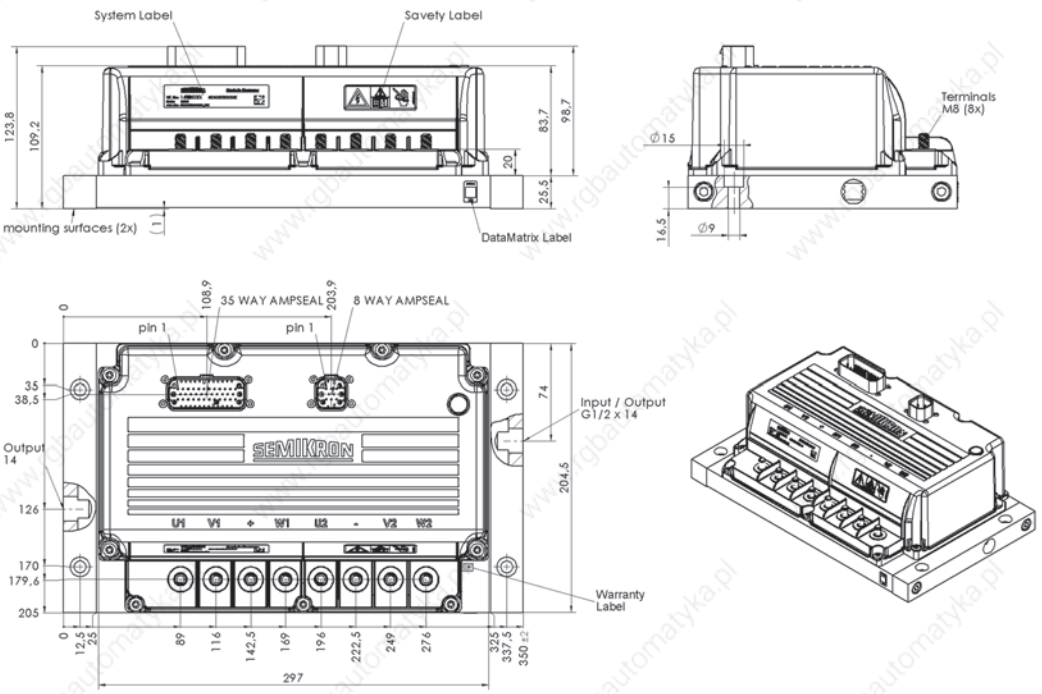

### Case 4



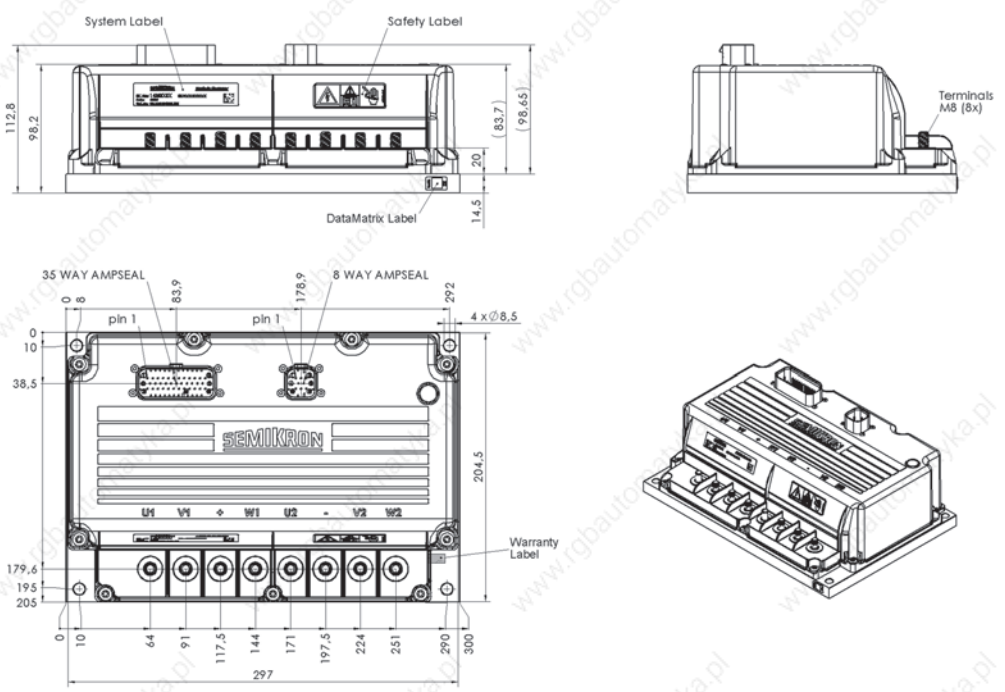

**Dimensions in mm**

## Cases

### Case 5



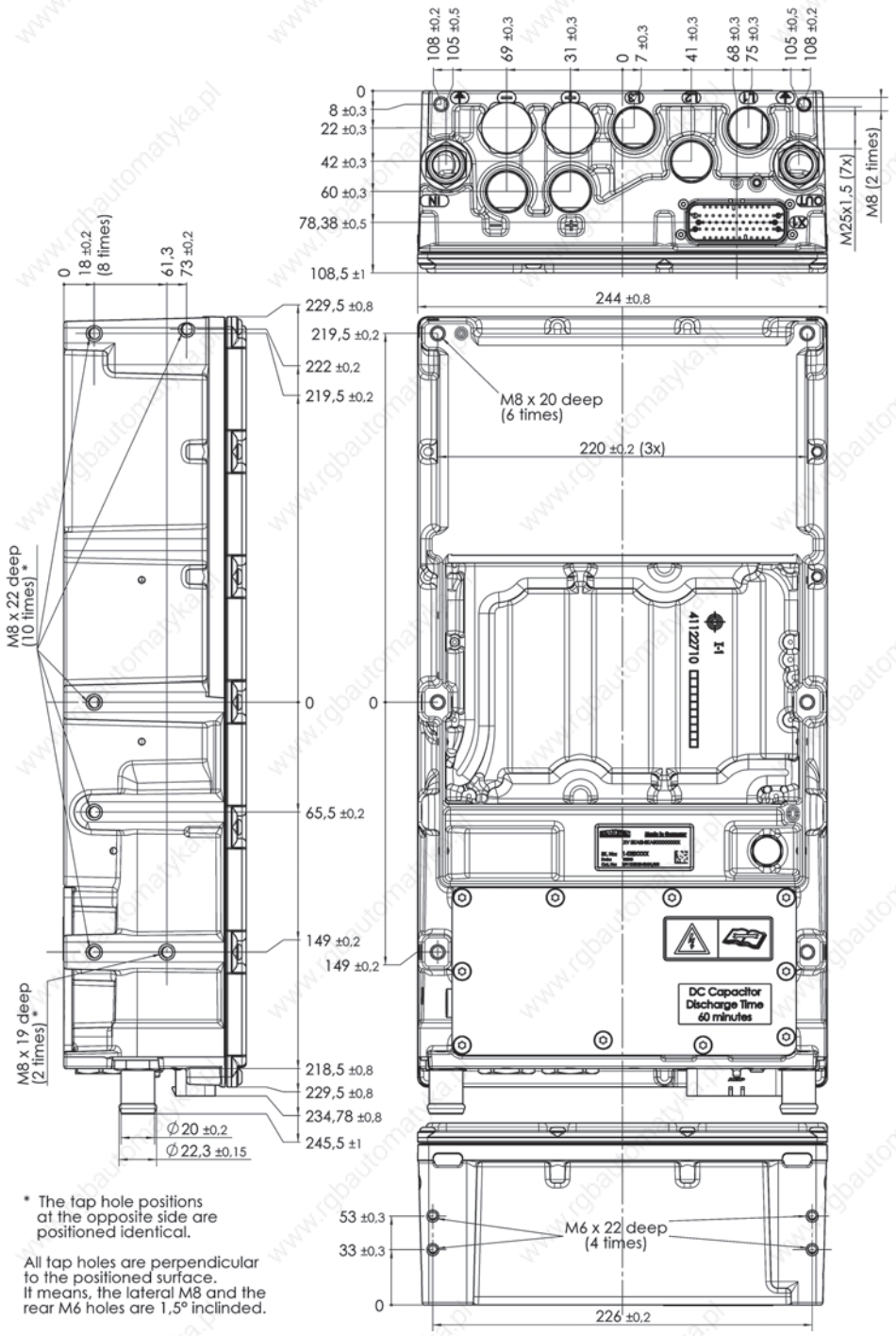

### Case 6




Dimensions in mm

## Cases

### Case 7




**Dimensions in mm**

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# Solutions - IGBT Platforms

## SEMISTACK Renewable Energy

Synchronus wind generators
Double-fed wind generators
Solar inverters

450 kW – 6 MW

## SKiiPRACK

Synchronus wind generators
Double-fed wind generators
High power AC drives

450 kW – 5 MW

## SEMIKUBE

Solar inverters
Pump & compressor drives

75 kW – 1000 kW

## SEMiXBOX

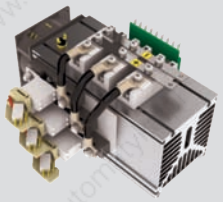
Elevators
Solar inverters
Uninteruptable power supplies

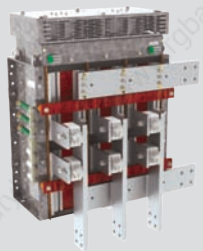
10 kW – 100 kW

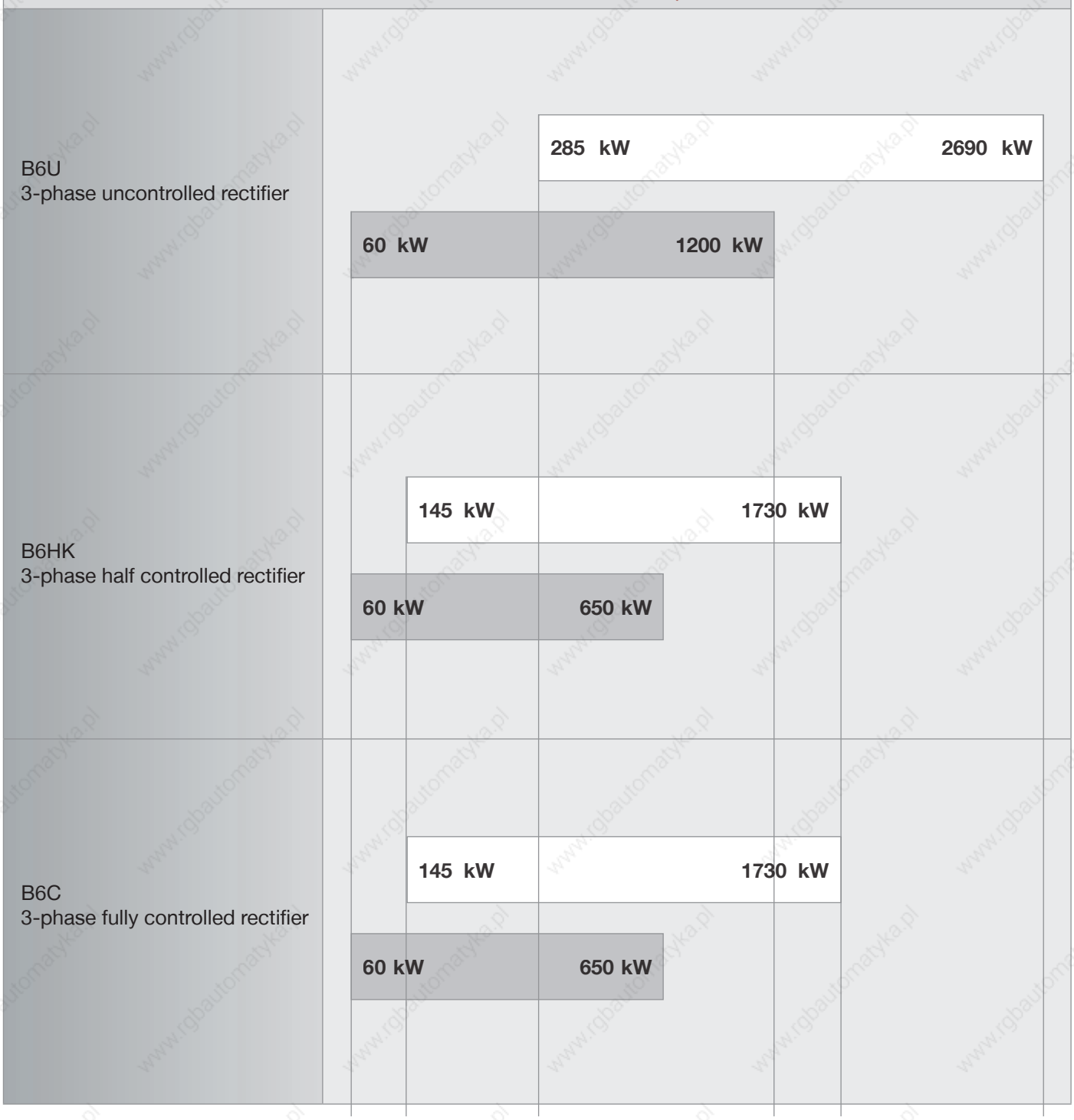
Power [kW] 10 75 100 450 1000 5200 6000

# Solutions - Diode / Thyristor Platforms

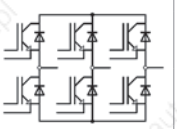
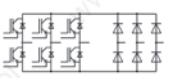
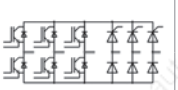
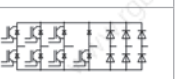
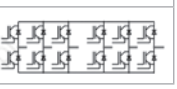
## SEMISTACK CLASSICS







# Solutions - SEMiXBOX

| Type | $V_{AC}$ V | $V_{DC}$ V | Current A | Component Family | Cooling | Heatsink profile | Iso-lated | Circuit |
|---|---|---|---|---|---|---|---|---|
| **Three-phase inverter** | | | | | | | | |
| **SKS 83F B6CI 58 V12** [1] | 500 | 900 | 83 | SEMiX | Forced-air cooled | Px 17 | yes |  |
| **SKS 110F B6CI 76 V12** [1] | 500 | 900 | 110 | SEMiX | Forced-air cooled | Px 17 | yes | |
| **SKS 118F B6CI 45 V06** [1] | 250 | 450 | 118 | SEMiX | Forced-air cooled | Px 17 | yes | |
| **SKS 150F B6CI 104 V12** [1] | 500 | 900 | 150 | SEMiX | Forced-air cooled | Px 17 | yes | |
| **SKS 85F B6CI+B6U 59 V12** [1] | 500 | 900 | 85 | SEMiX | Forced-air cooled | Px 17 | yes |  |
| **SKS 105F B6CI+B6U 72 V12** [1] | 500 | 900 | 105 | SEMiX | Forced-air cooled | Px 17 | yes | |
| **SKS 78F B6CI+B6HK 54 V12** [1] | 500 | 900 | 78 | SEMiX | Forced-air cooled | Px 17 | yes |  |
| **SKS 100F B6CI+B6HK 69 V12** [1] | 500 | 900 | 100 | SEMiX | Forced-air cooled | Px 17 | yes | |
| **SKS 80F B6CI+E1CIF+B6U 55 V12** [1] | 500 | 900 | 80 | SEMiX | Forced-air cooled | Px 17 | yes |  |
| **SKS 88F (B6CI)2P 61 V12** [1] | 500 | 900 | 88 | SEMiX | Forced-air cooled | Px 17 | yes |  |

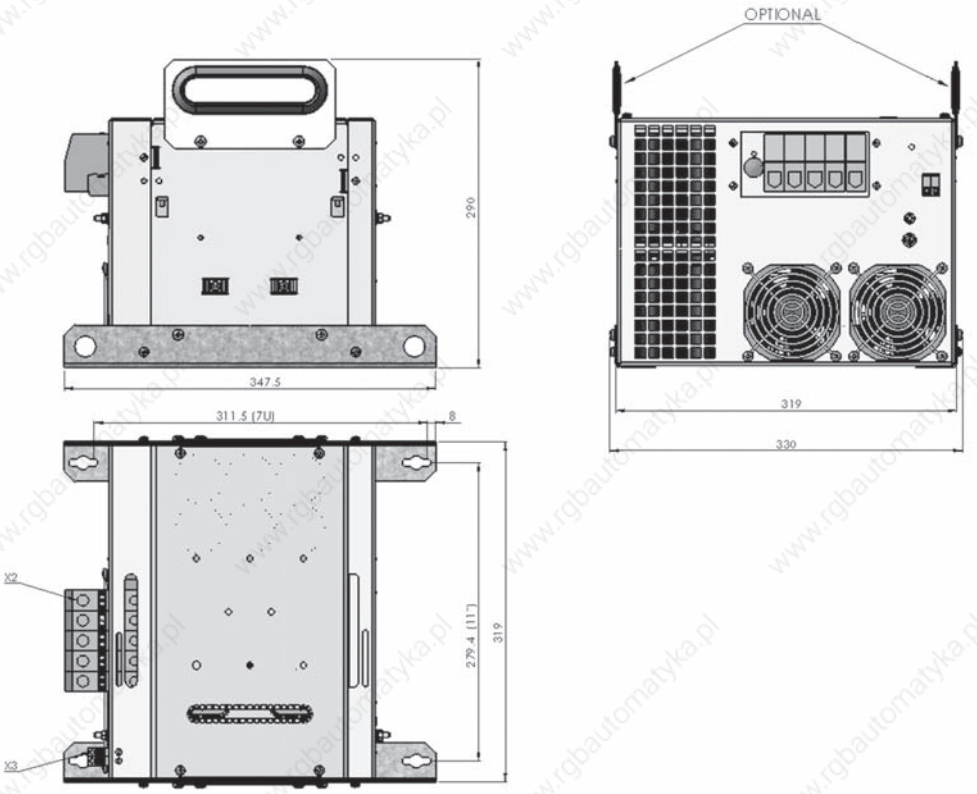
**Footnotes**

[1] New

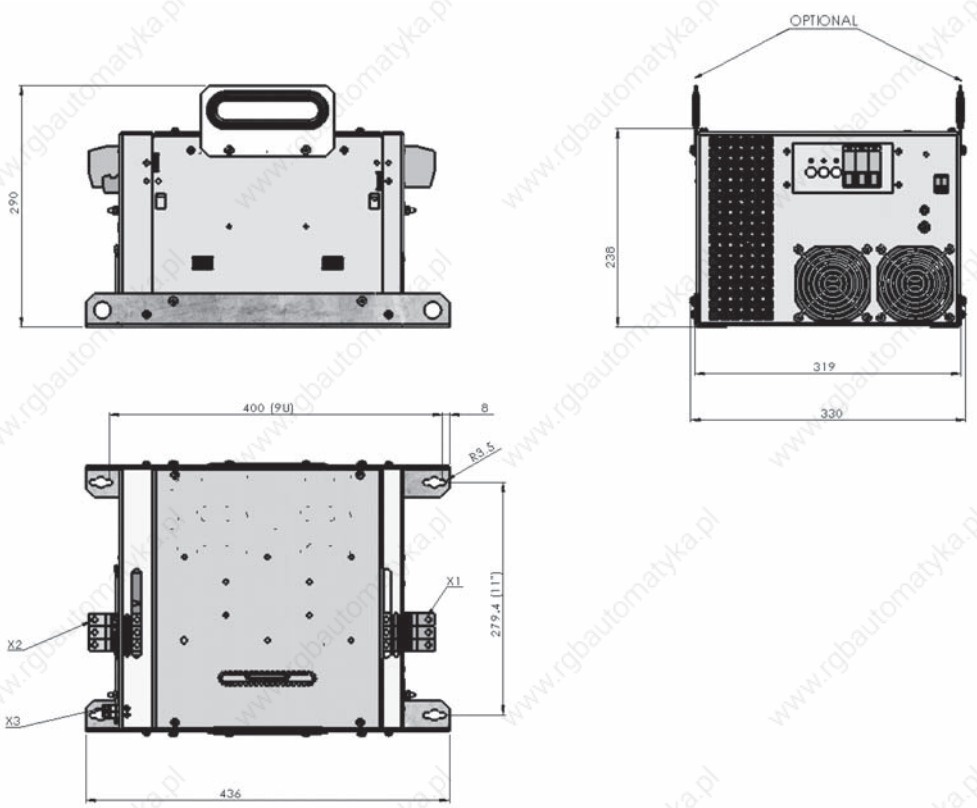
# Solutions - SEMiXBOX

## Cases

### CELL 2

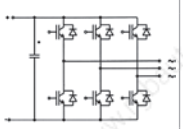
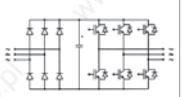



### CELL 3



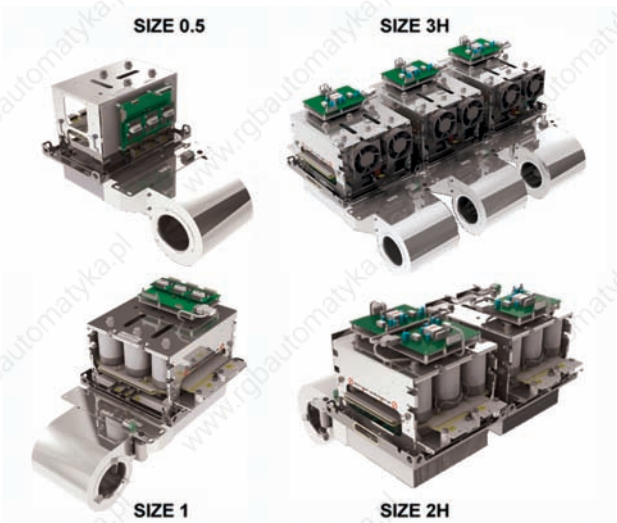

Dimensions in mm

# Solutions - SEMIKUBE

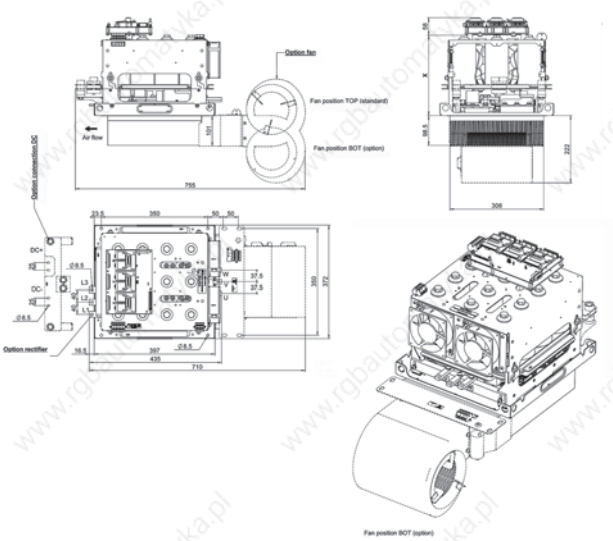
| Type | $V_{AC}$ V | $V_{DC}$ V | Current A | Component Family | Cooling | Heatsink profile | Iso-lated | Circuit |
|---|---|---|---|---|---|---|---|---|
| **Three-phase inverter** | | | | | | | | |
| **IGD-1-424-P1N4-DL-FA** | 460 | 750 | 200 | SEMITRANS | Forced-air cooled | PX 308 | yes | |
| **IGD-2-424-P1N6-DH-FA** | 460 | 750 | 350 | SEMITRANS | Forced-air cooled | PX 308 | yes | |
| **IGD-4-424-P1F7-BL-FA** | 460 | 750 | 750 | SEMITRANS | Forced-air cooled | PX 308 | yes |  |
| **IGD-8-326-E1F12-BH-FA** | 460 | 750 | 1230 | SEMITRANS | Forced-air cooled | PX 308 | yes | |
| **IGD-8-424-P1F9-BH-FA** | 460 | 750 | 1470 | SEMITRANS | Forced-air cooled | PX 308 | yes | |
| **IGD-8-426-E1F12-BH-FA** | 460 | 750 | 1470 | SEMITRANS | Forced-air cooled | PX 308 | yes | |
| **Three-phase rectifier and inverter** | | | | | | | | |
| **IGDD6-1-326-D1616-E1N6-DL-FA** | 460 | 750 | 150 | SEMITRANS/ SEMIPACK | Forced-air cooled | PX 308 | yes | |
| **IGDD6-1-426-D1616-E1N6-DL-FA** | 460 | 750 | 180 | SEMITRANS/ SEMIPACK | Forced-air cooled | PX 308 | yes | |
| **IGDD6-2-326-D1616-E1F12-DH-FA** | 460 | 750 | 280 | SEMITRANS/ SEMIPACK | Forced-air cooled | PX 308 | yes |  |
| **IGDD6-2-426-D1616-E1F12-DH-FA** | 460 | 750 | 330 | SEMITRANS/ SEMIPACK | Forced-air cooled | PX 308 | yes | |
| **IGDD6-4-326-D3816-E1F12-BL-FA** | 460 | 750 | 570 | SEMITRANS/ SEMIPACK | Forced-air cooled | PX 308 | yes | |
| **IGDD6-4-426-D3816-E1F12-BL-FA** | 460 | 750 | 680 | SEMITRANS/ SEMIPACK | Forced-air cooled | PX 308 | yes | |

## Cases

### SEMIKUBE size range

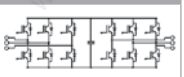
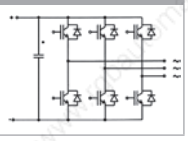



### Size 1



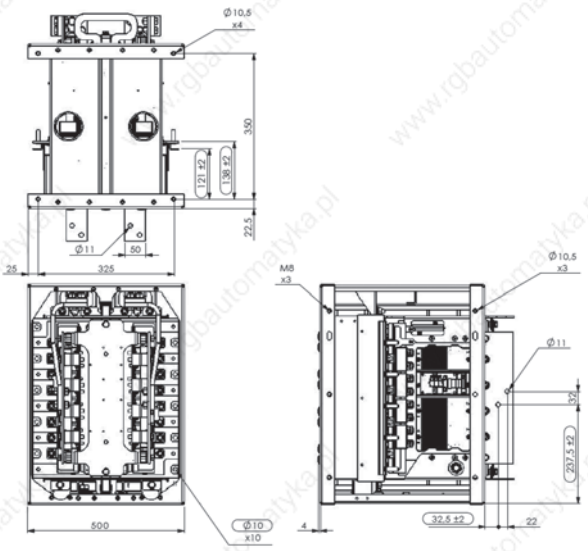
Dimensions in mm

# Solutions - SKiiPRACK

| Type | $V_{AC}$ V | $V_{DC}$ V | Current A | Component Family | Cooling | Heatsink profile | Iso-lated | Circuit |
|---|---|---|---|---|---|---|---|---|
| **4-Quadrant converter** | | | | | | | | |
| **SKS C 120 GDD 69/11 - A2A WA B1B** | 690 | 1100 | 1200 | SKiiP 3 | Water/ Glycol | - | yes |  |
| **Three-phase inverter** | | | | | | | | |
| **SKS C 120 GD 69/11 - A2A WA B1B** | 690 | 1100 | 1200 | SKiiP 3 | Water/ Glycol | - | yes |  |

## Cases

### SKiiPRACK basic stack element, the CELL




### 3-Cell vertical integration

Dimensions in mm

# SEMISTACK®RE

## Optimized converter for solar and wind

## Applications

The new SEMISTACK RE is a new high-power converter for use in renewable energy applications such as wind and solar power installations. SEMISTACK RE will typically be applied in synchronous and double-fed induction generators (DFIG) in wind turbines, as well as in central solar PV inverters. Up to four SEMISTACK RE converters can be connected in parallel and support applications of up to 6 MVA.

## Benefits

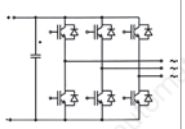
The SEMISTACK RE range features SKiiP 4, the latest generation of SEMIKRON's SKiiP intelligent power module family which integrates power components, driver and heat sink in a single case. SKiiP 4 modules enable to deliver an increase in power over the predecessor generation from 1.4 to 1.7 MVA. While the current carrying capacity of the smaller SEMISTACK RE solution featuring 3-bay SKiiP modules is 900 A, the bigger 4-bay SKiiP version has a current rating of between 1,000 A and 1,400 A, resulting in a power density increase of 17 % greater than in the predecessor version with combined SKiiP 3 modules.

Owing to the very low inductance planar DC busbar of the SEMISTACK RE and the internal construction of the SKiiP 4 nominal DC voltage can now be extended up to 1250 Vdc with the 1700 Vdc modules even when short circuit conditions are considered.

Signal processing on the SKiiP 4 is handled by a newly designed digital driver incorporating the standard control, monitoring and protection functions of the SKiiP 3 plus new additional functions of parameter configuration and diagnostic/fault memory. Further advantages are an improved isolation, a noise immunity inherent in digital control and the functionality and flexibility of the CANopen interface.

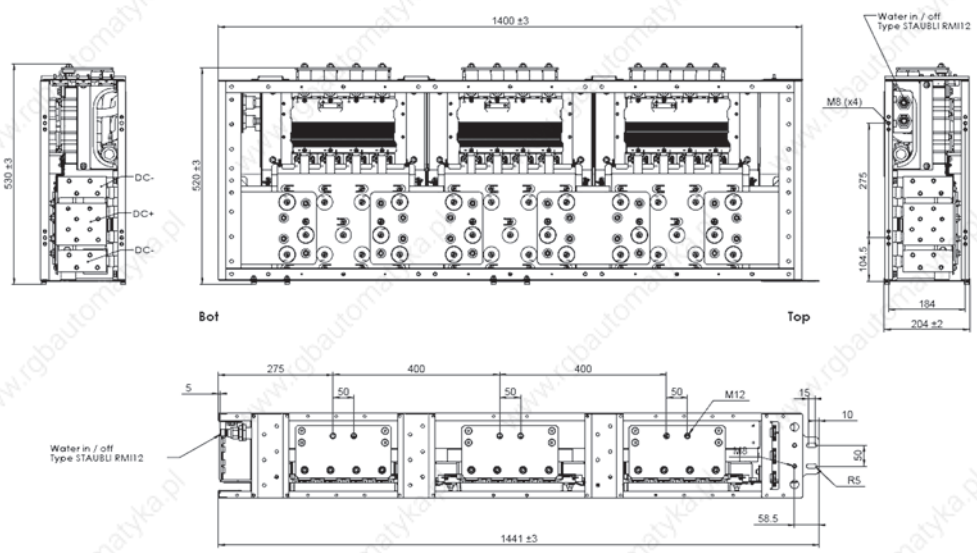
Owing to its 100 % solder free sintering process and innovative pressure contact system the thermal cycling capability of the SKiiP 4 is increased by a factor of 5. These enhancements to the SKiiP 4 are coupled with long lifetime polypropylene capacitors to ensure that the SEMISTACK RE meets the demanding requirements in today's grid connected power generation applications.

# Solutions - SEMISTACK Renewable Energy

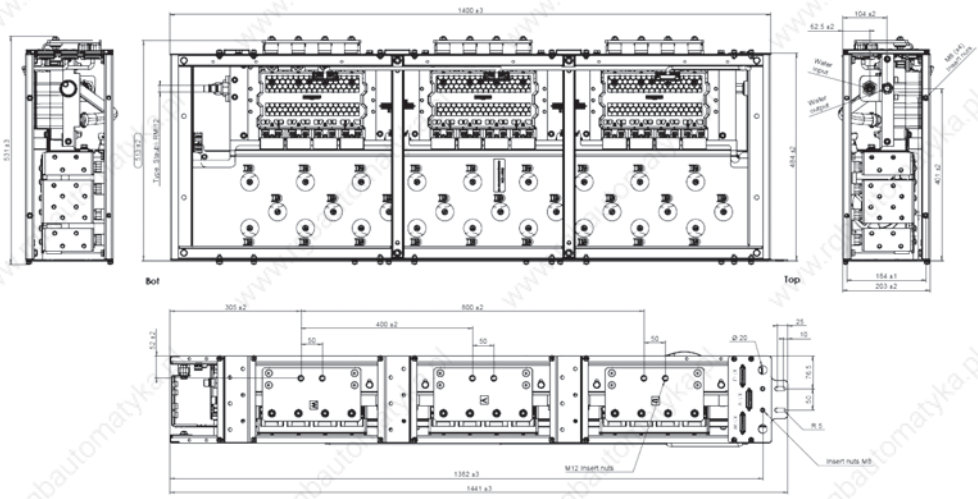
| Type | $V_{AC}$ V | $V_{DC}$ V | Current A | Component Family | Cooling | Heatsink profile | Iso-lated | Circuit |
|---|---|---|---|---|---|---|---|---|
| **Three-phase inverter** | | | | | | | | |
| **SKS B 085 GD 69/11 - WA PB** | 690 | 1100 | 850 | SKiiP 3 | Water/ Glycol | - | yes |  |
| **SKS B2 100 GD 69/11 - MA PB** [1] | 690 | 1100 | 1000 | SKiiP 3 | Water/ Glycol | - | yes | |
| **SKS B2 120 GD 69/11 - MA PB** [1] | 690 | 1100 | 1200 | SKiiP 3 | Water/ Glycol | - | yes | |
| **SKS B2 140 GD 69/12 - MA PB** [1] | 690 | 1250 | 1400 | SKiiP 4 | Water/ Glycol | - | yes | |

## Cases

### SKS B 085 GD 69/11 - WA PB




### SKS B2 100 GD 69/11 - MA PB, SKS B2 120 GD 69/11 - MA PB, and SKS B2 140 GD 69/12 - MA PB



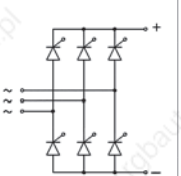

**Dimensions in mm**

## Footnotes

[1] New

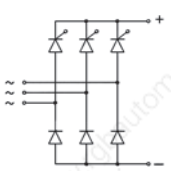
# Solutions - CLASSICS

| Type | $V_{AC}$ V | $V_{DC}$ V | Current A | Component Family | Cooling | Heatsink profile | Iso-lated | Circuit |
|---|---|---|---|---|---|---|---|---|
| **Three-phase fully-controlled thyristor bridge rectifier** | | | | | | | | |
| **SKS 88N B6C 60 V16** | 500 | 670 | 88 | SEMIPACK 1 | Natural cooled | P3/180 | yes | |
| **SKS 88N B6C 60 V16 SU** | 500 | 670 | 88 | SEMIPACK 1 | Natural cooled | P3/180 | yes | |
| **SKS 180F B6C 120 V16** | 500 | 670 | 180 | SEMIPACK 1 | Forced-air cooled | P3/180 | yes | |
| **SKS 180F B6C 120 V16 SU** | 500 | 670 | 180 | SEMIPACK 1 | Forced-air cooled | P3/180 | yes | |
| **SKS 215N B6C 145 V16** | 500 | 670 | 215 | Stud devices | Natural cooled | P1/150 | no | |
| **SKS 215N B6C 145 V16 SU** | 500 | 670 | 215 | Stud devices | Natural cooled | P1/150 | no | |
| **SKS 250F B6C 170 V16** | 500 | 670 | 250 | SEMIPACK 2 | Forced-air cooled | P3/265 | yes | |
| **SKS 250F B6C 170 V16 SU** | 500 | 670 | 250 | SEMIPACK 2 | Forced-air cooled | P3/265 | yes | |
| **SKS 355N B6C 240 V16** | 500 | 670 | 355 | Stud devices | Natural cooled | P1/200 | no | |
| **SKS 355N B6C 240 V16 SU** | 500 | 670 | 355 | Stud devices | Natural cooled | P1/200 | no | |
| **SKS 365F B6C 245 V16** | 500 | 670 | 365 | SEMIPACK 2 | Forced-air cooled | P16/200 | yes | |
| **SKS 365F B6C 245 V16 SU** | 500 | 670 | 365 | SEMIPACK 2 | Forced-air cooled | P16/200 | yes | |
| **SKS 570F B6C 380 V16** | 500 | 670 | 570 | SEMIPACK 3 | Forced-air cooled | P16/200 | yes | |
| **SKS 570F B6C 380 V16 SU** | 500 | 670 | 570 | SEMIPACK 3 | Forced-air cooled | P16/200 | yes | |
| **SKS 640F B6C 430 V16** | 500 | 670 | 640 | SEMIPACK 3 | Forced-air cooled | P16/200 | yes | |
| **SKS 640F B6C 430 V16 SU** | 500 | 670 | 640 | SEMIPACK 3 | Forced-air cooled | P16/200 | yes | |
| **SKS 700N B6C 470 V16** | 500 | 670 | 700 | Presspack | Natural cooled | P11/415 | no | |
| **SKS 700N B6C 470 V16 SU** | 500 | 670 | 700 | Presspack | Natural cooled | P11/415 | no | |
| **SKS 845N B6C 570 V16** | 500 | 670 | 845 | Presspack | Natural cooled | U3/515 | no | |
| **SKS 845N B6C 570 V16 SU** | 500 | 670 | 845 | Presspack | Natural cooled | U3/515 | no | |
| **SKS 970F B6C 650 V16** | 500 | 670 | 970 | SEMIPACK 5 | Forced-air cooled | P16/300 | yes | |
| **SKS 970F B6C 650 V16 SU** | 500 | 670 | 970 | SEMIPACK 5 | Forced-air cooled | P16/300 | yes | |
| **SKS 1000N B6C 670 V16** | 500 | 670 | 1000 | Presspack | Natural cooled | U3/515 | no | |
| **SKS 1000N B6C 670 V16 SU** | 500 | 670 | 1000 | Presspack | Natural cooled | U3/515 | no | |
| **SKS 1200F B6C 800 V16** | 500 | 670 | 1200 | Presspack | Forced-air cooled | P17/130 | no | |
| **SKS 1200F B6C 800 V16 SU** | 500 | 670 | 1200 | Presspack | Forced-air cooled | P17/130 | no | |
| **SKS 1500F B6C 1010 V16** | 500 | 670 | 1500 | Presspack | Forced-air cooled | P17/130 | no | |
| **SKS 1500F B6C 1010 V16 SU** | 500 | 670 | 1500 | Presspack | Forced-air cooled | P17/130 | no | |
| **SKS 1890F B6C 1270 V16** | 500 | 670 | 1890 | Presspack | Forced-air cooled | P18/180 | no | |
| **SKS 1890F B6C 1270 V16 ZU** | 500 | 670 | 1890 | Presspack | Forced-air cooled | P18/180 | no | |
| **SKS 2580F B6C 1730 V16** | 500 | 670 | 2580 | Presspack | Forced-air cooled | N4/250 | no | |
| **SKS 2580F B6C 1730 V16 ZU** | 500 | 670 | 2580 | Presspack | Forced-air cooled | N4/250 | no | |

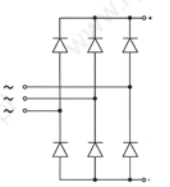


# Solutions - CLASSICS

| Type | $V_{AC}$ V | $V_{DC}$ V | Current A | Component Family | Cooling | Heatsink profile | Iso-lated | Circuit |
|---|---|---|---|---|---|---|---|---|
| **Three-phase half-controlled bridge rectifier** | | | | | | | | |
| **SKS 88N B6HK 60 V16** [1] | 500 | 670 | 88 | SEMIPACK 1 | Natural cooled | P3/180 | yes | |
| **SKS 88N B6HK 60 V16 SU** [1] | 500 | 670 | 88 | SEMIPACK 1 | Natural cooled | P3/180 | yes | |
| **SKS 180F B6HK 120 V16** [1] | 500 | 670 | 180 | SEMIPACK 1 | Forced-air cooled | P3/180 | yes | |
| **SKS 180F B6HK 120 V16 SU** [1] | 500 | 670 | 180 | SEMIPACK 1 | Forced-air cooled | P3/180 | yes | |
| **SKS 215N B6HK 145 V16** [1] | 500 | 670 | 215 | Stud devices | Natural cooled | P1/150 | no | |
| **SKS 215N B6HK 145 V16 SU** [1] | 500 | 670 | 215 | Stud devices | Natural cooled | P1/150 | no | |
| **SKS 250F B6HK 170 V16** [1] | 500 | 670 | 250 | SEMIPACK 2 | Forced-air cooled | P3/265 | yes | |
| **SKS 250F B6HK 170 V16 SU** [1] | 500 | 670 | 250 | SEMIPACK 2 | Forced-air cooled | P3/265 | yes | |
| **SKS 355N B6HK 240 V16** [1] | 500 | 670 | 355 | Stud devices | Natural cooled | P1/200 | no | |
| **SKS 355N B6HK 240 V16 SU** [1] | 500 | 670 | 355 | Stud devices | Natural cooled | P1/200 | no | |
| **SKS 365F B6HK 245 V16** [1] | 500 | 670 | 365 | SEMIPACK 2 | Forced-air cooled | P16/200 | yes | |
| **SKS 365F B6HK 245 V16 SU** [1] | 500 | 670 | 365 | SEMIPACK 2 | Forced-air cooled | P16/200 | yes | |
| **SKS 570F B6HK 380 V16** [1] | 500 | 670 | 570 | SEMIPACK 3 | Forced-air cooled | P16/200 | yes | |
| **SKS 570F B6HK 380 V16 SU** [1] | 500 | 670 | 570 | SEMIPACK 3 | Forced-air cooled | P16/200 | yes | |
| **SKS 640F B6HK 430 V16** [1] | 500 | 670 | 640 | SEMIPACK 3 | Forced-air cooled | P16/200 | yes | |
| **SKS 640F B6HK 430 V16 SU** [1] | 500 | 670 | 640 | SEMIPACK 3 | Forced-air cooled | P16/200 | yes | |
| **SKS 700N B6HK 470 V16** [1] | 500 | 670 | 700 | Presspack | Natural cooled | P11/415 | no | |
| **SKS 700N B6HK 470 V16 SU** [1] | 500 | 670 | 700 | Presspack | Natural cooled | P11/415 | no | |
| **SKS 845N B6HK 570 V16** [1] | 500 | 670 | 845 | Presspack | Natural cooled | U3/515 | no | |
| **SKS 845N B6HK 570 V16 SU** [1] | 500 | 670 | 845 | Presspack | Natural cooled | U3/515 | no | |
| **SKS 970F B6HK 650 V16** [1] | 500 | 670 | 970 | SEMIPACK 5 | Forced-air cooled | P16/300 | yes | |
| **SKS 970F B6HK 650 V16 SU** [1] | 500 | 670 | 970 | SEMIPACK 5 | Forced-air cooled | P16/300 | yes | |
| **SKS 1000N B6HK 670 V16** [1] | 500 | 670 | 1000 | Presspack | Natural cooled | U3/515 | no | |
| **SKS 1000N B6HK 670 V16 SU** [1] | 500 | 670 | 1000 | Presspack | Natural cooled | U3/515 | no | |
| **SKS 1200F B6HK 800 V16** [1] | 500 | 670 | 1200 | Presspack | Forced-air cooled | P17/130 | no | |
| **SKS 1200F B6HK 800 V16 SU** [1] | 500 | 670 | 1200 | Presspack | Forced-air cooled | P17/130 | no | |
| **SKS 1500F B6HK 1010 V16** [1] | 500 | 670 | 1500 | Presspack | Forced-air cooled | P17/130 | no | |
| **SKS 1500F B6HK 1010 V16 SU** [1] | 500 | 670 | 1500 | Presspack | Forced-air cooled | P17/130 | no | |
| **SKS 1890F B6HK 1270 V16** [1] | 500 | 670 | 1890 | Presspack | Forced-air cooled | P18/180 | no | |
| **SKS 1890F B6HK 1270 V16 ZU** [1] | 500 | 670 | 1890 | Presspack | Forced-air cooled | P18/180 | no | |
| **SKS 2580F B6HK 1730 V16** [1] | 500 | 670 | 2580 | Presspack | Forced-air cooled | N4/250 | no | |
| **SKS 2580F B6HK 1730 V16 ZU** [1] | 500 | 670 | 2580 | Presspack | Forced-air cooled | N4/250 | no | |



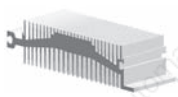
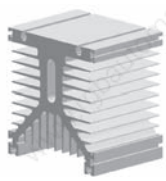
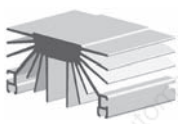
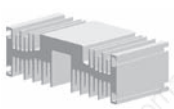
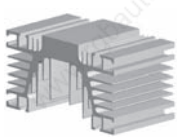
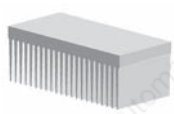
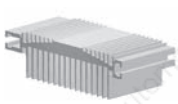
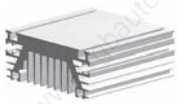
# Solutions - CLASSICS

| Type | $V_{AC}$ V | $V_{DC}$ V | Current A | Component Family | Cooling | Heatsink profile | Iso-lated | Circuit |
|---|---|---|---|---|---|---|---|---|
| **Three-phase uncontrolled diode bridge rectifier** | | | | | | | | |
| **SKS 91N B6U 60 V16** [1] | 500 | 670 | 91 | SEMIPACK 1 | Natural cooled | P3/180 | yes | |
| **SKS 91N B6U 60 V16 SU** [1] | 500 | 670 | 91 | SEMIPACK 1 | Natural cooled | P3/180 | yes | |
| **SKS 185F B6U 125 V16** [1] | 500 | 670 | 185 | SEMIPACK 1 | Forced-air cooled | P3/180 | yes | |
| **SKS 185F B6U 125 V16 SU** [1] | 500 | 670 | 185 | SEMIPACK 1 | Forced-air cooled | P3/180 | yes | |
| **SKS 290F B6U 195 V16** [1] | 500 | 670 | 290 | SEMIPACK 2 | Forced-air cooled | P3/265 | yes | |
| **SKS 290F B6U 195 V16 SU** [1] | 500 | 670 | 290 | SEMIPACK 2 | Forced-air cooled | P3/265 | yes | |
| **SKS 425N B6U 285 V16** [1] | 500 | 670 | 425 | Stud devices | Natural cooled | P1/150 | no | |
| **SKS 425N B6U 285 V16 SU** [1] | 500 | 670 | 425 | Stud devices | Natural cooled | P1/150 | no | |
| **SKS 430F B6U 290 V16** [1] | 500 | 670 | 430 | SEMIPACK 2 | Forced-air cooled | P16/200 | yes | |
| **SKS 430F B6U 290 V16 SU** [1] | 500 | 670 | 430 | SEMIPACK 2 | Forced-air cooled | P16/200 | yes | |
| **SKS 535N B6U 360 V16** [1] | 500 | 670 | 535 | Stud devices | Natural cooled | P1/200 | no | |
| **SKS 535N B6U 360 V16 SU** [1] | 500 | 670 | 535 | Stud devices | Natural cooled | P1/200 | no | |
| **SKS 660F B6U 440 V16** [1] | 500 | 670 | 660 | SEMIPACK 3 | Forced-air cooled | P16/200 | yes | |
| **SKS 660F B6U 440 V16 SU** [1] | 500 | 670 | 660 | SEMIPACK 3 | Forced-air cooled | P16/200 | yes |  |
| **SKS 850F B6U 570 V16** [1] | 500 | 670 | 850 | SEMIPACK 3 | Forced-air cooled | P16/200 | yes | |
| **SKS 850F B6U 570 V16 SU** [1] | 500 | 670 | 850 | SEMIPACK 3 | Forced-air cooled | P16/200 | yes | |
| **SKS 1185N B6U 795 V16** [1] | 500 | 670 | 1185 | Presspack | Natural cooled | P11/415 | no | |
| **SKS 1185N B6U 795 V16 SU** [1] | 500 | 670 | 1185 | Presspack | Natural cooled | P11/415 | no | |
| **SKS 1220F B6U 820 V16** [1] | 500 | 670 | 1220 | SEMIPACK 5 | Forced-air cooled | P16/300 | yes | |
| **SKS 1220F B6U 820 V16 SU** [1] | 500 | 670 | 1220 | SEMIPACK 5 | Forced-air cooled | P16/300 | yes | |
| **SKS 1630N B6U 1090 V16** [1] | 500 | 670 | 1630 | Presspack | Natural cooled | U3/515 | no | |
| **SKS 1630N B6U 1090 V16 ZU** [1] | 500 | 670 | 1630 | Presspack | Natural cooled | U3/515 | no | |
| **SKS 1910N B6U 1280 V16** [1] | 500 | 670 | 1910 | Presspack | Natural cooled | U3/515 | no | |
| **SKS 1910N B6U 1280 V16 ZU** [1] | 500 | 670 | 1910 | Presspack | Natural cooled | U3/515 | no | |
| **SKS 1950F B6U 1305 V16** [1] | 500 | 670 | 1950 | Presspack | Forced-air cooled | P17/130 | no | |
| **SKS 1950F B6U 1305 V16 ZU** [1] | 500 | 670 | 1950 | Presspack | Forced-air cooled | P17/130 | no | |
| **SKS 2300F B6U 1540 V16** [1] | 500 | 670 | 2300 | Presspack | Forced-air cooled | P18/180 | no | |
| **SKS 2300F B6U 1540 V16 ZU** [1] | 500 | 670 | 2300 | Presspack | Forced-air cooled | P18/180 | no | |
| **SKS 4015F B6U 2690 V16** [1] | 500 | 670 | 4015 | Presspack | Forced-air cooled | N4/250 | no | |

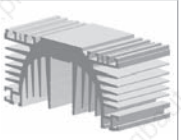
**Footnotes**

[1] New

# Accessories - Heatsinks

| Type | Suitable for | $R_{thsa}$ natural cooling K/W | $R_{thsa}$ forced air or water cooling K/W | w kg | w kg/m | Picture |
|---|---|---|---|---|---|---|
| **Forced-air cooled** | | | | | | |
| **N 4** | Capsules | - | 0.04 | - | 25.1 |  |
| **P 1** | Studs or modules | 0.7 | 0.4 | - | 11.3 | |
| **P 3** | Isolated base modules | 0.45 | 0.14 | - | 17.6 |  |
| **P 8** [1] | Capsules | 0.35 | 0.07 | - | 9.6 |  |
| **P 8,5** [1] | Capsules | 0.3 | 0.08 | - | 9.5 | |
| **P 9** [1] | Capsules | 0.21 | 0.06 | - | 17.8 |  |
| **P 11** | Capsules | 0.2 | 0.05 | - | 15 |  |
| **P 16** | SKiiP or modules | - | 0.06 | - | 23.5 |  |
| **P 17** | Capsules | 0.45 | 0.12 | - | 10.6 | |
| **P 18** | Capsules | 0.37 | 0.08 | - | 12.2 |  |
| **P 21** [1] | Isolated base modules | - | 0.02 | - | 40.8 | |
| **Px 308** [1] | SKiiP or modules | - | 0.013 | - | 12.2 | |
| **R 4A** | Isolated base modules | 1.4 | 0.38 | 0.6 | - |  |

# Accessories - Heatsinks

| Type | Suitable for | $R_{thsa}$ natural cooling K/W | $R_{thsa}$ forced air or water cooling K/W | w kg | w kg/m | Picture |
|---|---|---|---|---|---|---|
| **Forced-air cooled** | | | | | | |
| **U 3** | Capsules | 0.14 | 0.06 | - | 23.7 |  |
| **Natural cooled** | | | | | | |
| **P 4** [1)] | Stud device | 0.27 | - | - | 20.6 | |

**footnotes**

[1)] Non standard item, available on request only, typical minimum batch quantities of 60 pieces will apply

# Accessories - Fans

| Type | $V_{in}$ V | f Hz | $V_{air}$ / t $m^3/h$ | $P_{max}$ V | $T_{Amax}$ °C | w kg | Noise dB | Picture |
|---|---|---|---|---|---|---|---|---|
| **Axial Fans** | | | | | | | | |
| **SKF 3-230-01** | 230 | 50 | 159 / 190 | 15 / 14 | 70 | 0.55 | 37 / 41 | |
| **Centrifugal Fans** | | | | | | | | |
| **SKF 17 A-230-11** | 230 | 50 | 850 / 930 | 110 / 120 | 70 | 2 | 74 | |
| **SKF N4-230-01** | 230 | 50 | 1500 / 1700 | 210 / 280 | 80 / 70 | 3.1 | 76 / 78 | |
| **Radial Fans** | | | | | | | | |
| **SKF 16 A-230-01** | 230 | 50 | 615 / 575 | 135 / 154 | 50 / 40 | 3.6 | 55 / 57 | |
| **SKF 16 A-230-11** | 230 | 50 | 615 / 575 | 135 / 154 | 50 / 40 | 3.6 | 55 / 57 | |
| **SKF 16 B-230-01** | 230 | 50 | 610 / 565 | 170 / 197 | 40 | 3.6 | 58 / 57 | |

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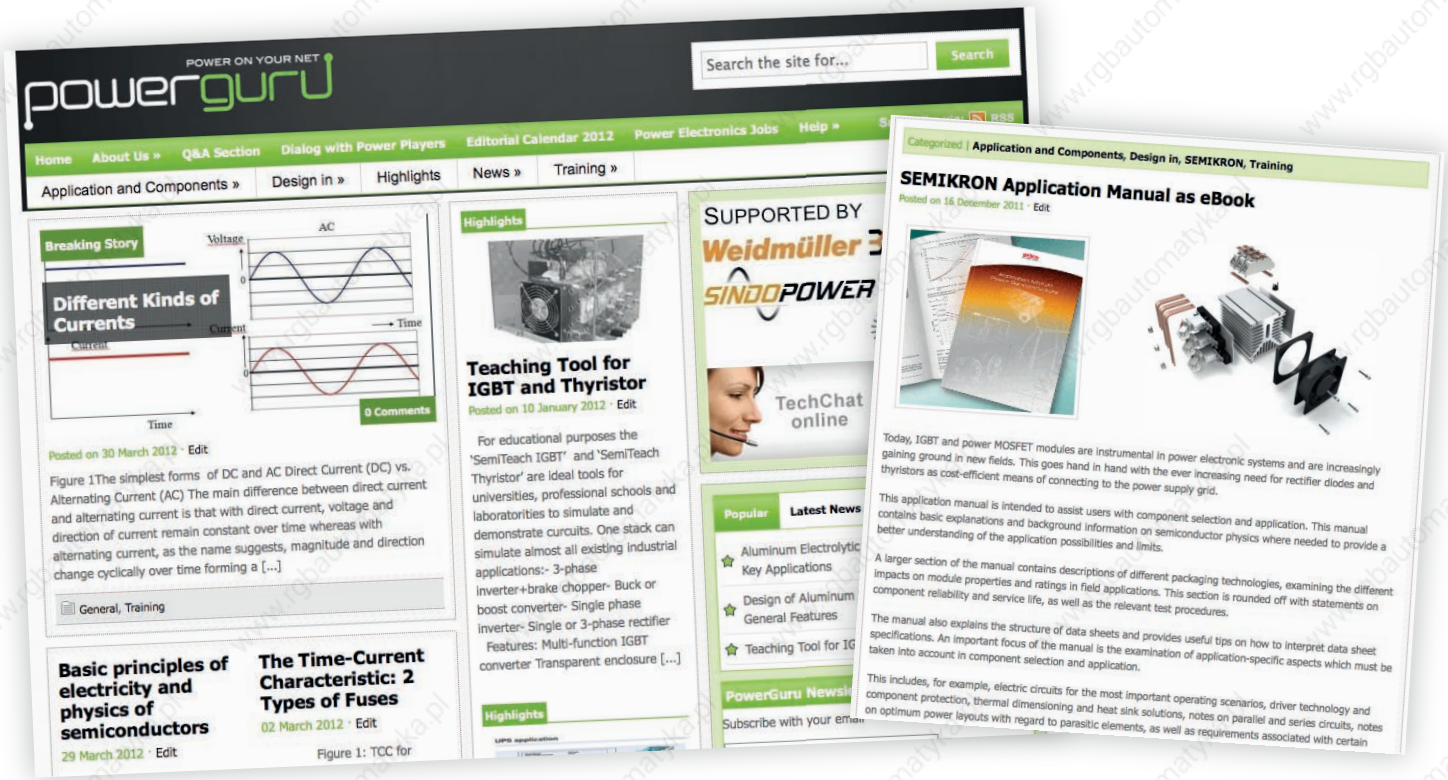


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