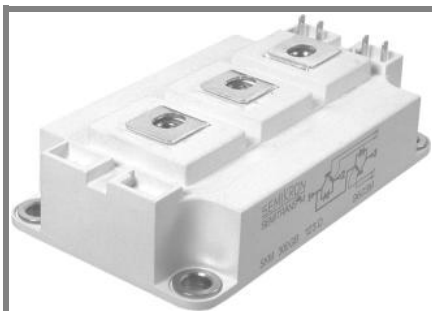


# SKM 200GB173D



**SEMITRANS® 3**

## IGBT Modules

**SKM 200GB173D**

**SKM 200GB173D1**

**SKM 200GAL173D**

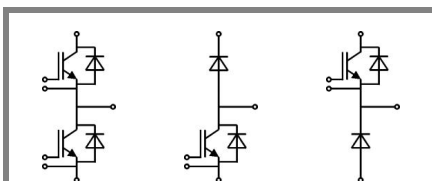
**SKM 200GAR173D**

## Features

- MOS input (voltage controlled)
- N channel , Homogeneous Si
- Low inductance case
- Very low tail current with low temperature dependence
- High short circuit capability, self limiting to  $6 \times I_{Cnom}$
- Latch-up free
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DCB Direct Copper Bonding Technology
- Large clearance (13 mm) and creepage distance (20 mm)

## Typical Applications\*

- AC inverter drives on mains 575 - 750 V<sub>AC</sub>
- DC bus voltage 750 - 1200 V<sub>DC</sub>
- Public transport (auxiliary syst.)
- Switching (not for linear use)



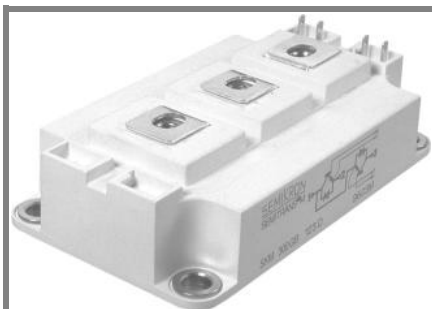
**GB**

**GAL**

**GAR**

| Absolute Maximum Ratings |                                                                                                        |                           | T <sub>c</sub> = 25 °C, unless otherwise specified |       |
|--------------------------|--------------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------|-------|
| Symbol                   | Conditions                                                                                             |                           | Values                                             | Units |
| IGBT                     |                                                                                                        |                           |                                                    |       |
| V <sub>CES</sub>         | T <sub>j</sub> = 25 °C                                                                                 |                           | 1700                                               | V     |
| I <sub>C</sub>           | T <sub>j</sub> = 150 °C                                                                                | T <sub>case</sub> = 25 °C | 220                                                | A     |
|                          |                                                                                                        | T <sub>case</sub> = 80 °C | 150                                                | A     |
| I <sub>CRM</sub>         | I <sub>CRM</sub> = 2xI <sub>Cnom</sub>                                                                 |                           | 300                                                | A     |
| V <sub>GES</sub>         |                                                                                                        |                           | ± 20                                               | V     |
| t <sub>psc</sub>         | V <sub>CC</sub> = 1200 V; V <sub>GE</sub> ≤ 20 V; T <sub>j</sub> = 125 °C<br>V <sub>CES</sub> < 1700 V |                           | 10                                                 | µs    |
| Inverse Diode            |                                                                                                        |                           |                                                    |       |
| I <sub>F</sub>           | T <sub>j</sub> = 150 °C                                                                                | T <sub>case</sub> = 25 °C | 150                                                | A     |
|                          |                                                                                                        | T <sub>case</sub> = 80 °C | 100                                                | A     |
| I <sub>FRM</sub>         | I <sub>FRM</sub> = 2xI <sub>Fnom</sub>                                                                 |                           | 300                                                | A     |
| I <sub>FSM</sub>         | t <sub>p</sub> = 10 ms; sin.                                                                           | T <sub>j</sub> = 150 °C   | 1450                                               | A     |
| Freewheeling Diode       |                                                                                                        |                           |                                                    |       |
| I <sub>F</sub>           | T <sub>j</sub> = 150 °C                                                                                | T <sub>case</sub> = 25 °C | 230                                                | A     |
|                          |                                                                                                        | T <sub>case</sub> = 80 °C | 150                                                | A     |
| I <sub>FRM</sub>         | I <sub>FRM</sub> = 2xI <sub>Fnom</sub>                                                                 |                           | 400                                                | A     |
| I <sub>FSM</sub>         | t <sub>p</sub> = 10 ms; sin                                                                            | T <sub>j</sub> = 150 °C   | 2200                                               | A     |
| Module                   |                                                                                                        |                           |                                                    |       |
| I <sub>t(RMS)</sub>      |                                                                                                        |                           | 500                                                | A     |
| T <sub>vj</sub>          |                                                                                                        |                           | - 40 ... + 150                                     | °C    |
| T <sub>stg</sub>         |                                                                                                        |                           | - 40 ... + 125                                     | °C    |
| V <sub>isol</sub>        | AC, 1 min.                                                                                             |                           | 4000                                               | V     |

| Characteristics      |                                                                                  |  | T <sub>c</sub> = 25 °C, unless otherwise specified |                                            |      |       |    |
|----------------------|----------------------------------------------------------------------------------|--|----------------------------------------------------|--------------------------------------------|------|-------|----|
| Symbol               | Conditions                                                                       |  | min.                                               | typ.                                       | max. | Units |    |
| IGBT                 |                                                                                  |  |                                                    |                                            |      |       |    |
| V <sub>GE(th)</sub>  | V <sub>GE</sub> = V <sub>CE</sub> , I <sub>C</sub> = 10 mA                       |  | 4,8                                                | 5,5                                        | 6,2  | V     |    |
| I <sub>CES</sub>     | V <sub>GE</sub> = 0 V, V <sub>CE</sub> = V <sub>CES</sub> T <sub>J</sub> = 25 °C |  |                                                    | 0,1                                        | 0,3  | mA    |    |
| V <sub>CE0</sub>     |                                                                                  |  |                                                    | T <sub>J</sub> = 25 °C                     | 1,65 | 1,9   | V  |
|                      |                                                                                  |  |                                                    | T <sub>J</sub> = 125 °C                    | 1,9  | 2,15  | V  |
| r <sub>CE</sub>      | V <sub>GE</sub> = 15 V                                                           |  |                                                    | T <sub>J</sub> = 25°C                      | 11,7 | 13,3  | mΩ |
|                      |                                                                                  |  |                                                    | T <sub>J</sub> = 125°C                     | 17,3 | 19    | mΩ |
| V <sub>CE(sat)</sub> | I <sub>Cnom</sub> = 150 A, V <sub>GE</sub> = 15 V                                |  |                                                    | T <sub>J</sub> = 25°C <sub>chiplev.</sub>  | 3,4  | 3,9   | V  |
|                      |                                                                                  |  |                                                    | T <sub>J</sub> = 125°C <sub>chiplev.</sub> | 4,5  | 5     | V  |
| C <sub>ies</sub>     | V <sub>CE</sub> = 25, V <sub>GE</sub> = 0 V      f = 1 MHz                       |  |                                                    |                                            | 20   | nF    |    |
| C <sub>oes</sub>     |                                                                                  |  |                                                    |                                            | 2    | nF    |    |
| C <sub>res</sub>     |                                                                                  |  |                                                    |                                            | 0,55 | nF    |    |
| Q <sub>G</sub>       | VGE=0V/+20V                                                                      |  |                                                    |                                            | 2000 | nC    |    |
| t <sub>d(on)</sub>   | R <sub>Gon</sub> = 4 Ω                                                           |  | V <sub>CC</sub> = 1200V<br>I <sub>C</sub> = 150A   | 580                                        |      | ns    |    |
| t <sub>r</sub>       |                                                                                  |  |                                                    | 100                                        |      | ns    |    |
| E <sub>on</sub>      |                                                                                  |  |                                                    | 95                                         |      | mJ    |    |
| t <sub>d(off)</sub>  | R <sub>Goff</sub> = 4 Ω                                                          |  | T <sub>J</sub> = 125 °C<br>V <sub>GE</sub> = ± 15V | 750                                        |      | ns    |    |
|                      |                                                                                  |  |                                                    | 40                                         |      | ns    |    |
|                      |                                                                                  |  |                                                    | 45                                         |      | mJ    |    |
| R <sub>th(j-c)</sub> | per IGBT                                                                         |  |                                                    |                                            | 0,1  | K/W   |    |



**SEMITRANS® 3**

## IGBT Modules

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**SKM 200GB173D1**

**SKM 200GAL173D**

**SKM 200GAR173D**

## Features

- MOS input (voltage controlled)
- N channel , Homogeneous Si
- Low inductance case
- Very low tail current with low temperature dependence
- High short circuit capability, self limiting to  $6 \times I_{cnom}$
- Latch-up free
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DCB Direct Copper Bonding Technology
- Large clearance (13 mm) and creepage distance (20 mm)

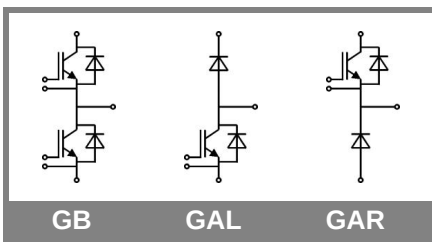
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- DC bus voltage 750 - 1200 V<sub>DC</sub>
- Public transport (auxiliary syst.)
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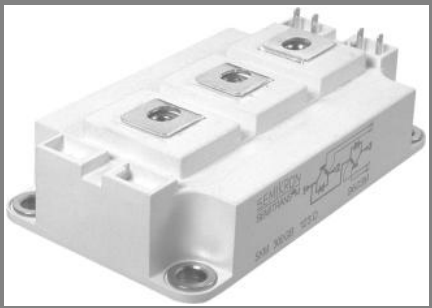
| Characteristics      |                                                   |                                               |      |       |       |
|----------------------|---------------------------------------------------|-----------------------------------------------|------|-------|-------|
| Symbol               | Conditions                                        | min.                                          | typ. | max.  | Units |
| <b>Inverse Diode</b> |                                                   |                                               |      |       |       |
| $V_F = V_{EC}$       | $I_{Fnom} = 150 \text{ A}; V_{GE} = 0 \text{ V}$  | $T_j = 25 \text{ }^\circ\text{C}_{chiplev.}$  | 2,2  | 2,7   | V     |
|                      |                                                   | $T_j = 125 \text{ }^\circ\text{C}_{chiplev.}$ | 1,9  |       | V     |
| $V_{F0}$             |                                                   | $T_j = 125 \text{ }^\circ\text{C}$            | 1,3  | 1,5   | V     |
| $r_F$                |                                                   | $T_j = 125 \text{ }^\circ\text{C}$            | 4,5  | 6,2   | mΩ    |
| $I_{RRM}$            | $I_F = 150 \text{ A}$                             | $T_j = 125 \text{ }^\circ\text{C}$            | 85   |       | A     |
| $Q_{rr}$             | $di/dt = 1000 \text{ A}/\mu\text{s}$              |                                               | 38   |       | μC    |
| $E_{rr}$             | $V_{GE} = -15 \text{ V}; V_{CC} = 1200 \text{ V}$ |                                               |      |       | mJ    |
| $R_{th(j-c)D}$       | per diode                                         |                                               |      | 0,32  | K/W   |
| <b>FWD</b>           |                                                   |                                               |      |       |       |
| $V_F = V_{EC}$       | $I_{Fnom} = 150 \text{ A}; V_{GE} = 0 \text{ V}$  | $T_j = 25 \text{ }^\circ\text{C}_{chiplev.}$  | 2    | 2,4   | V     |
|                      |                                                   | $T_j = 125 \text{ }^\circ\text{C}_{chiplev.}$ | 1,8  |       | V     |
| $V_{F0}$             |                                                   | $T_j = 125 \text{ }^\circ\text{C}$            | 1,3  | 1,5   | V     |
| $r_F$                |                                                   | $T_j = 125 \text{ }^\circ\text{C}$            | 3,5  | 4,5   | V     |
| $I_{RRM}$            | $I_F = 150 \text{ A}$                             | $T_j = 125 \text{ }^\circ\text{C}$            | 110  |       | A     |
| $Q_{rr}$             |                                                   |                                               | 50   |       | μC    |
| $E_{rr}$             | $V_{GE} = -15 \text{ V}; V_{CC} = 1200 \text{ V}$ |                                               |      |       | mJ    |
| $R_{th(j-c)FD}$      | per diode                                         |                                               |      | 0,21  | K/W   |
| <b>Module</b>        |                                                   |                                               |      |       |       |
| $L_{CE}$             |                                                   |                                               | 15   | 20    | nH    |
| $R_{CC'+EE'}$        | res., terminal-chip                               | $T_{case} = 25 \text{ }^\circ\text{C}$        | 0,35 |       | mΩ    |
|                      |                                                   | $T_{case} = 125 \text{ }^\circ\text{C}$       | 0,5  |       | mΩ    |
| $R_{th(c-s)}$        | per module                                        |                                               |      | 0,038 | K/W   |
| $M_s$                | to heat sink M6                                   |                                               | 3    | 5     | Nm    |
| w                    |                                                   |                                               |      | 325   | g     |

This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX.

\* The specifications of our components may not be considered as an assurance of component characteristics. Components have to be tested for the respective application. Adjustments may be necessary. The use of SEMIKRON products in life support appliances and systems is subject to prior specification and written approval by SEMIKRON. We therefore strongly recommend prior consultation of our personal.



# SKM 200GB173D



SEMITRANS® 3

## IGBT Modules

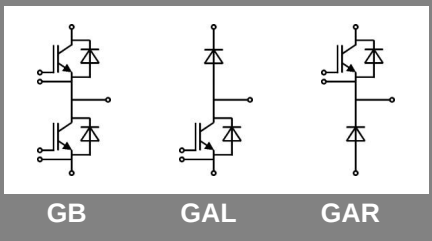
SKM 200GB173D  
SKM 200GB173D1  
SKM 200GAL173D  
SKM 200GAR173D

### Features

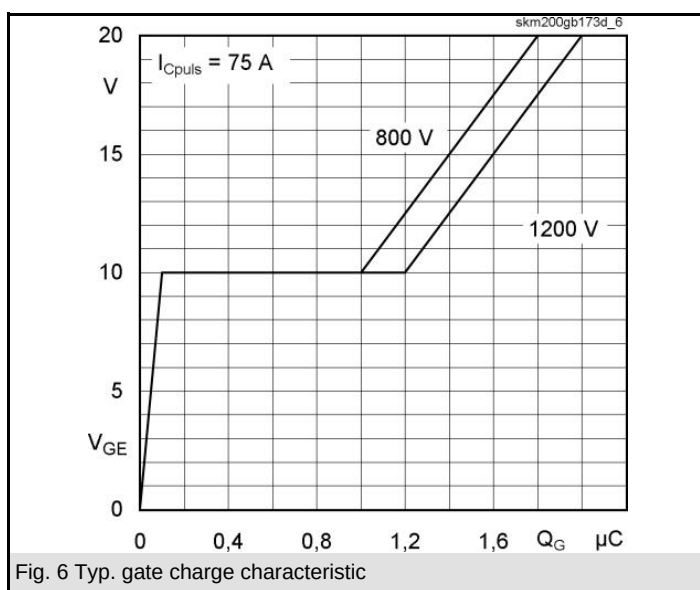
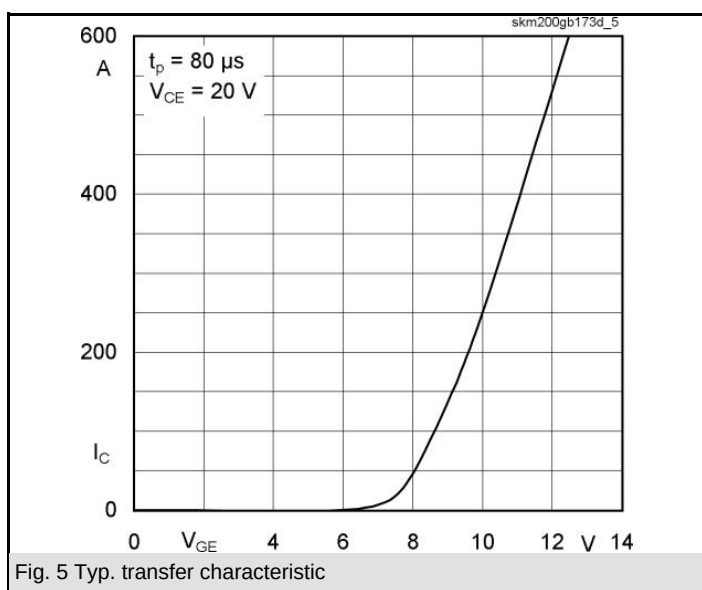
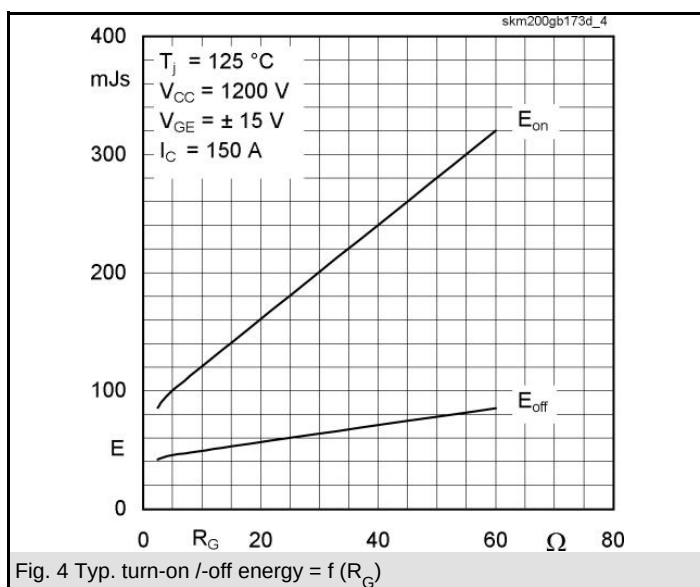
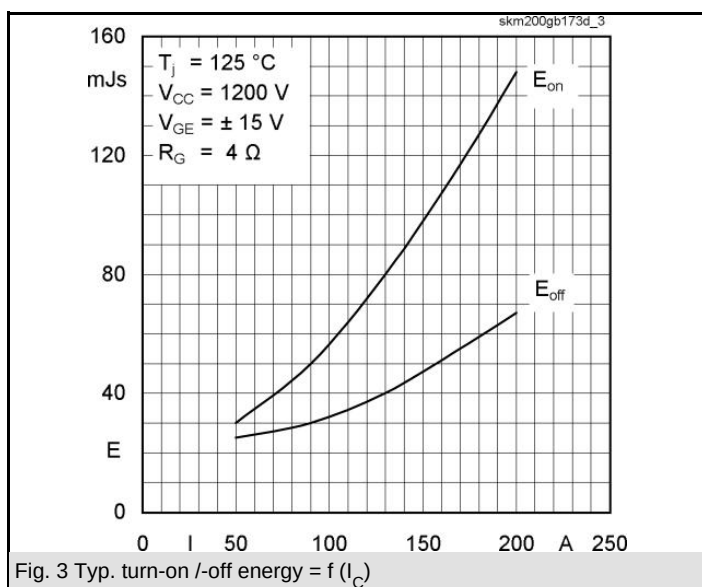
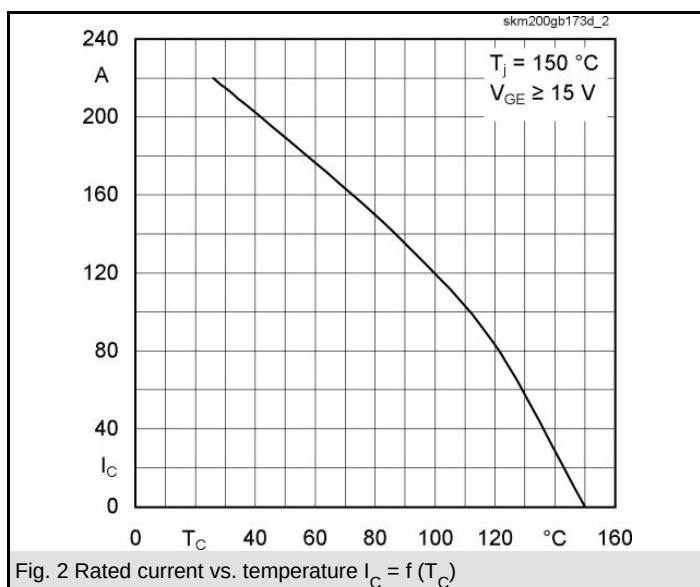
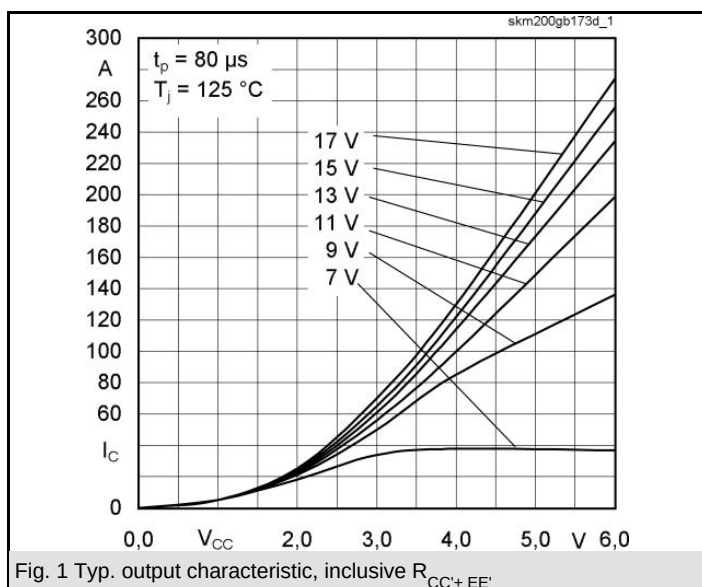
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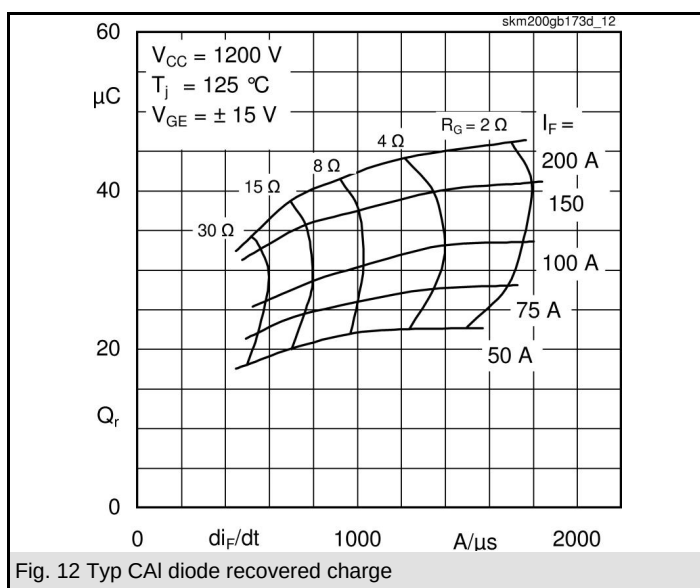
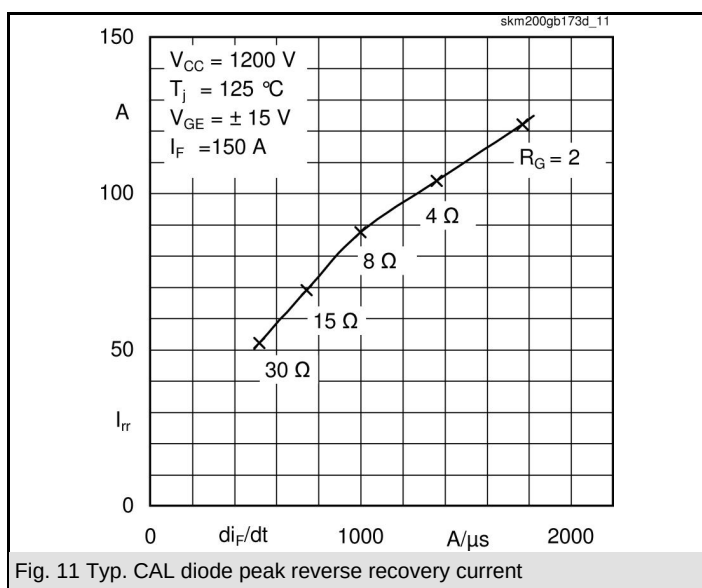
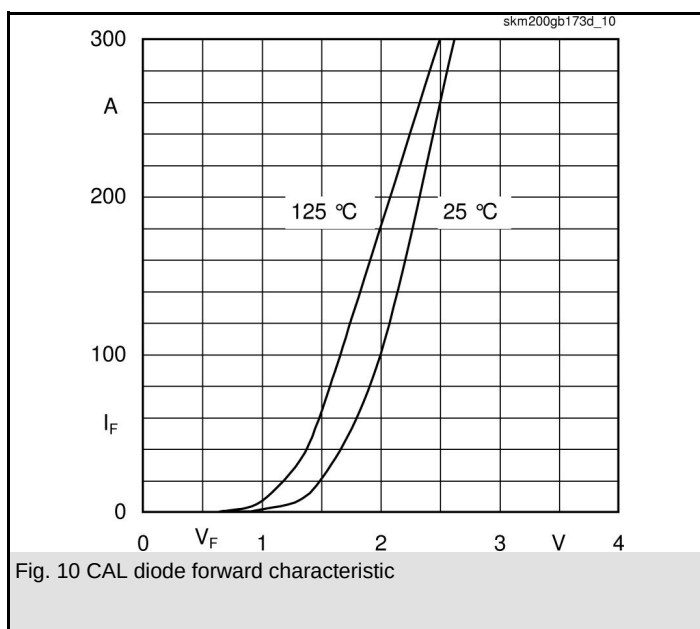
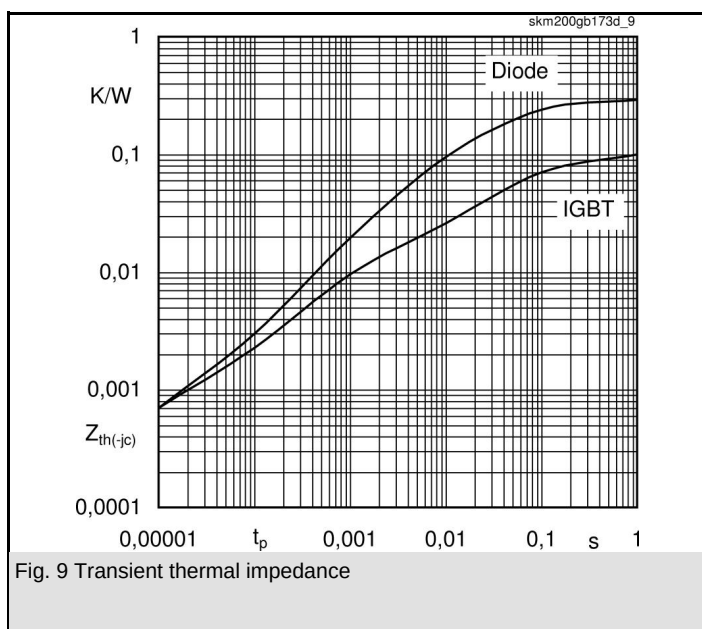
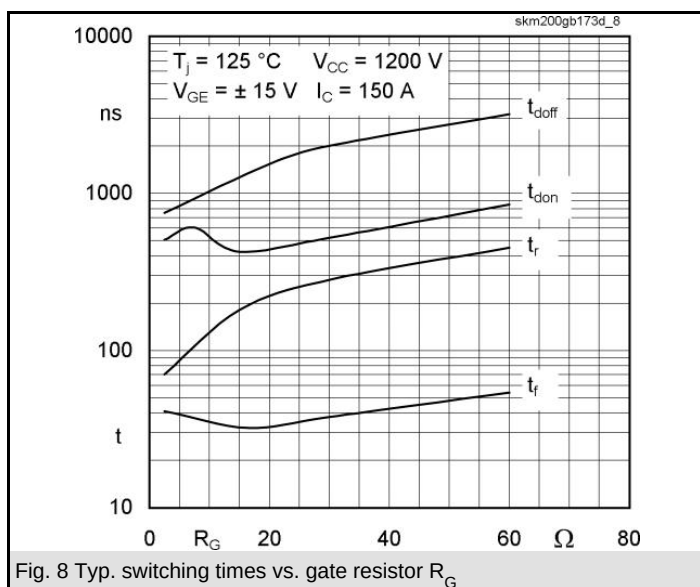
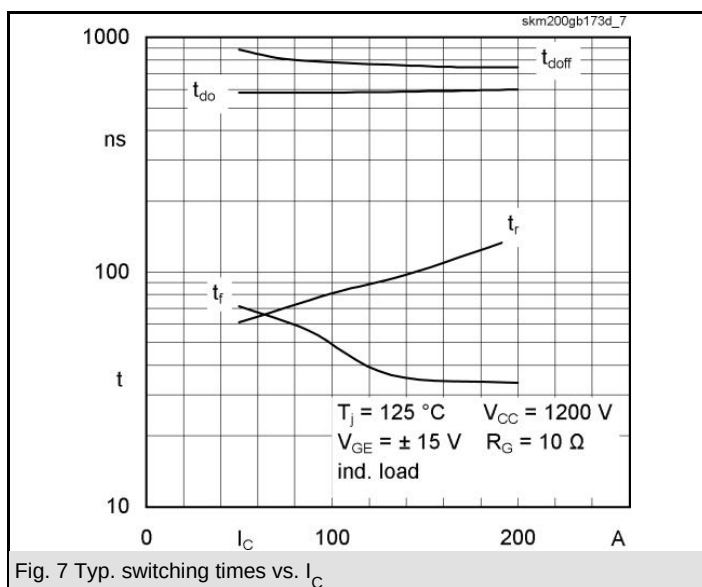
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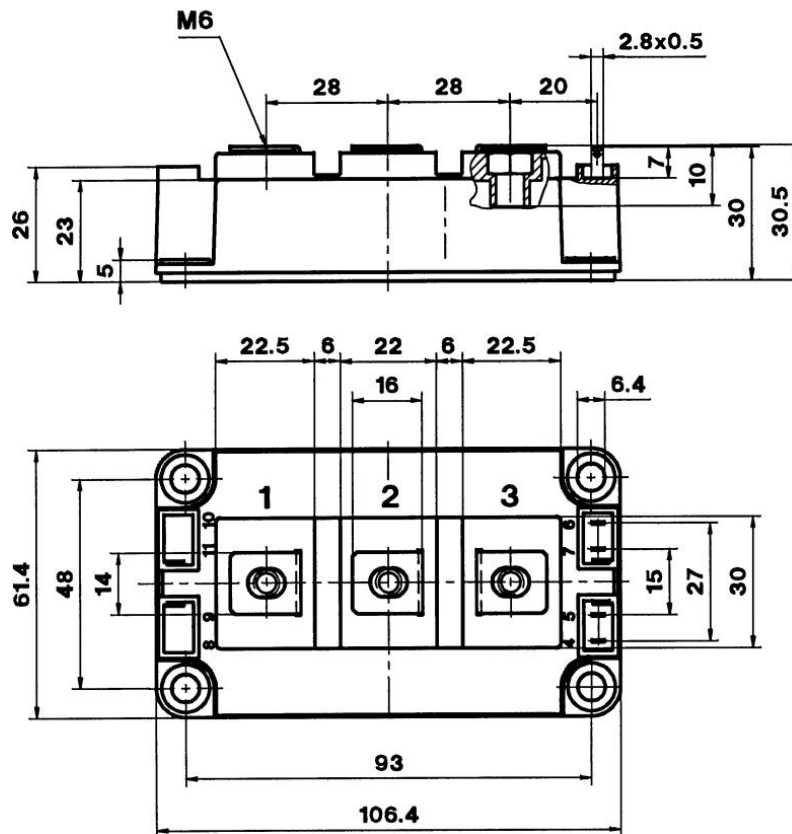


| $Z_{th}$       |            |        |       |
|----------------|------------|--------|-------|
| Symbol         | Conditions | Values | Units |
| $Z_{th(j-c)I}$ |            |        |       |
| $R_i$          | $i = 1$    | 72     | mk/W  |
| $R_i$          | $i = 2$    | 19     | mk/W  |
| $R_i$          | $i = 3$    | 6,9    | mk/W  |
| $R_i$          | $i = 4$    | 2,1    | mk/W  |
| $\tau_{ui}$    | $i = 1$    | 0,0946 | s     |
| $\tau_{ui}$    | $i = 2$    | 0,011  | s     |
| $\tau_{ui}$    | $i = 3$    | 0,0011 | s     |
| $\tau_{ui}$    | $i = 4$    | 0      | s     |
| $Z_{th(j-c)D}$ |            |        |       |
| $R_i$          | $i = 1$    | 230    | mk/W  |
| $R_i$          | $i = 2$    | 70     | mk/W  |
| $R_i$          | $i = 3$    | 17     | mk/W  |
| $R_i$          | $i = 4$    | 3      | mk/W  |
| $\tau_{ui}$    | $i = 1$    | 0,0839 | s     |
| $\tau_{ui}$    | $i = 2$    | 0,0069 | s     |
| $\tau_{ui}$    | $i = 3$    | 0,0028 | s     |
| $\tau_{ui}$    | $i = 4$    | 0,0002 | s     |

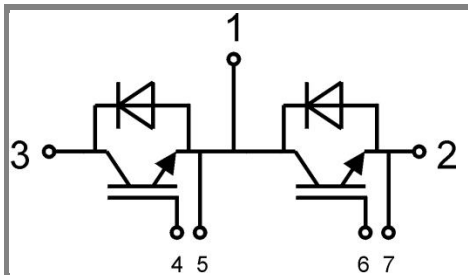




CASED56

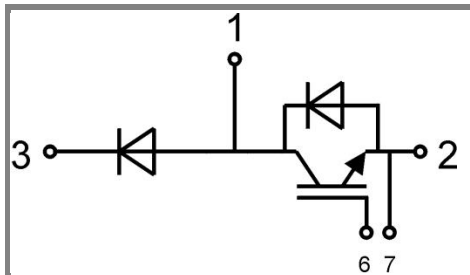


Case D 56



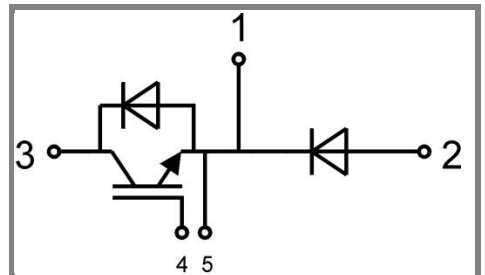
GB

Case D 56



GAL

Case D 57 (→ D 56)



GAR

Case D 58 (→ D 56)