

# SKM 75GD123D



**SEMITRANS® 6**

## IGBT Modules

SKM 75GD123DL

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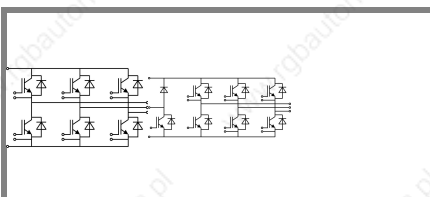
SKM 75GDL123D

### 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 Bonding Technology
- Large clearance (9 mm) and creepage distance (13 mm)

### Typical Applications\*

- Switched mode power supplies
- DC servo and robot drives
- Three phase inverters for AC motor speed control
- Switching (not for linear use)



GD GD L

| Absolute Maximum Ratings |  | $T_c = 25^\circ\text{C}$ , unless otherwise specified |     |                  |
|--------------------------|--|---|-----|------------------|
| Symbol                   | Conditions   | Values  |     | Units            |
| <b>IGBT</b>              |  |   |     |                  |
| $V_{CES}$                | $T_j = 25^\circ\text{C}$   | 1200  |     | V                |
| $I_C$                    | $T_j = 150^\circ\text{C}$  | $T_{case} = 25^\circ\text{C}$                         | 75  | A                |
|                          |  | $T_{case} = 80^\circ\text{C}$                         | 50  | A                |
| $I_{CRM}$                | $I_{CRM} = 2 \times I_{Cnom}$  | 100   |     | A                |
| $V_{GES}$                |  | $\pm 20$  |     | V                |
| $t_{psc}$                | $V_{CC} = 600\text{ V}; V_{GE} \leq 20\text{ V}; T_j = 125^\circ\text{C}$<br>$V_{CES} < 1200\text{ V}$ | 10  |     | $\mu\text{s}$    |
| <b>Inverse Diode</b>     |  |   |     |                  |
| $I_F$                    | $T_j = 150^\circ\text{C}$  | $T_{case} = 25^\circ\text{C}$                         | 75  | A                |
|                          |  | $T_{case} = 80^\circ\text{C}$                         | 50  | A                |
| $I_{FRM}$                | $I_{FRM} = 2 \times I_{Fnom}$  | 100   |     | A                |
| $I_{FSM}$                | $t_p = 10\text{ ms}; \sin.$  | $T_j = 150^\circ\text{C}$                             | 550 | A                |
| <b>Module</b>            |  |   |     |                  |
| $I_{t(RMS)}$             |  | 100   |     | A                |
| $T_{vj}$                 |  | - 40 ... + 150  |     | $^\circ\text{C}$ |
| $T_{stg}$                |  | - 40 ... + 125  |     | $^\circ\text{C}$ |
| $V_{isol}$               | AC, 1 min.   | 2500  |     | V                |

| Characteristics |  | $T_c = 25^\circ\text{C}$ , unless otherwise specified   |      |      |       |                  |    |
|-----------------|--|---|------|------|-------|------------------|----|
| Symbol          | Conditions                                     | min.  | typ. | max. | Units |                  |    |
| <b>IGBT</b>     |  |   |      |      |       |                  |    |
| $V_{GE(th)}$    | $V_{GE} = V_{CE}, I_C = 2\text{ mA}$           | 4,5   | 5,5  | 6,5  | V     |                  |    |
| $I_{CES}$       | $V_{GE} = 0\text{ V}, V_{CE} = V_{CES}$        | $T_j = 25^\circ\text{C}$                                |      | 0,4  | 1,2   | mA               |    |
| $V_{CE0}$       |  | $T_j = 25^\circ\text{C}$                                |      | 1,4  | 1,6   | V                |    |
|                 |  | $T_j = 125^\circ\text{C}$                               |      | 1,6  | 1,8   | V                |    |
| $r_{CE}$        | $V_{GE} = 15\text{ V}$                         | $T_j = 25^\circ\text{C}$                                |      | 22   | 28    | $\text{m}\Omega$ |    |
|                 |  | $T_j = 125^\circ\text{C}$                               |      | 30   | 38    | $\text{m}\Omega$ |    |
| $V_{CE(sat)}$   | $I_{Cnom} = 50\text{ A}, V_{GE} = 15\text{ V}$ | $T_j = T_{chiplever.}$                                  |      | 2,5  | 3     | V                |    |
| $C_{ies}$       | $V_{CE} = 25, V_{GE} = 0\text{ V}$             | $f = 1\text{ MHz}$                                      |      | 3,3  | 4,3   | nF               |    |
| $C_{oes}$       |  |   |      | 0,5  | 0,6   | nF               |    |
| $C_{res}$       |  |   |      | 0,22 | 0,3   | nF               |    |
| $t_{d(on)}$     | $R_{Gon} = 22\ \Omega$                         | $V_{CC} = 600\text{ V}$<br>$I_C = 50\text{ A}$          |      |      | 44    | 100              | ns |
| $t_r$           |  |   |      |      | 56    | 100              | ns |
| $E_{on}$        | $R_{Goff} = 22\ \Omega$                        | $T_j = 125^\circ\text{C}$<br>$V_{GE} = \pm 15\text{ V}$ |      |      | 8     |                  | mJ |
| $t_{d(off)}$    |  |   |      |      | 380   | 500              | ns |
| $t_f$           |  |   |      |      | 70    | 100              | ns |
| $E_{off}$       |  |   |      |      | 5     | mJ               |    |
| $R_{th(j-c)}$   | per IGBT                                       |   |      | 0,32 |       | K/W              |    |

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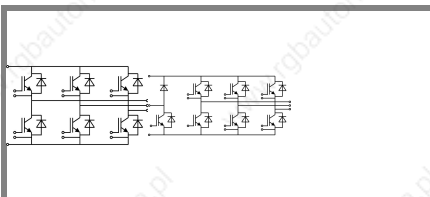
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### Characteristics

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|----------------------|---|---|------|------|-------|
| <b>Inverse Diode</b> |   |   |      |      |       |
| $V_F = V_{EC}$       | $I_{Fnom} = 50 \text{ A}; V_{GE} = 0 \text{ V}$ | $T_j = 25 \text{ }^\circ\text{C}_{chiplev.}$  | 2    | 2,5  | V     |
|                      |   | $T_j = 125 \text{ }^\circ\text{C}_{chiplev.}$ | 1,8  |      | V     |
| $V_{F0}$             |   | $T_j = 25 \text{ }^\circ\text{C}$             | 1,1  | 1,2  | V     |
|                      |   | $T_j = 125 \text{ }^\circ\text{C}$            |      |      | V     |
| $r_F$                |   | $T_j = 25 \text{ }^\circ\text{C}$             | 18   | 26   | mΩ    |
|                      |   | $T_j = 125 \text{ }^\circ\text{C}$            |      |      | mΩ    |
| $I_{RRM}$            | $I_F = 50 \text{ A}$                            | $T_j = 125 \text{ }^\circ\text{C}$            | 35   |      | A     |
| $Q_{rr}$             | $di/dt = 800 \text{ A}/\mu\text{s}$             |   | 7    |      | μC    |
| $E_{rr}$             | $V_{GE} = 0 \text{ V}; V_{CC} = 600 \text{ V}$  |   | 2,2  |      | mJ    |
| $R_{th(j-c)D}$       | per diode                                       |   |      | 0,6  | K/W   |
| <b>Module</b>        |   |   |      |      |       |
| $L_{CE}$             |   |   |      | 60   | nH    |
| $R_{th(c-s)}$        | per module                                      |   |      | 0,05 | K/W   |
| $M_s$                | to heat sink M5                                 |   |      |      | Nm    |
| $M_t$                | to terminals                                    | 4   |      | 5    | Nm    |
| w                    |   |   |      | 175  | 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.

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**SEMITRANS<sup>®</sup> 6**

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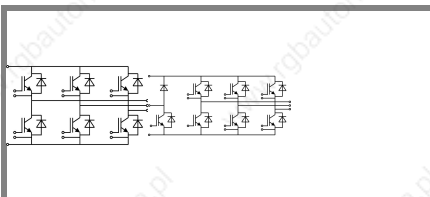
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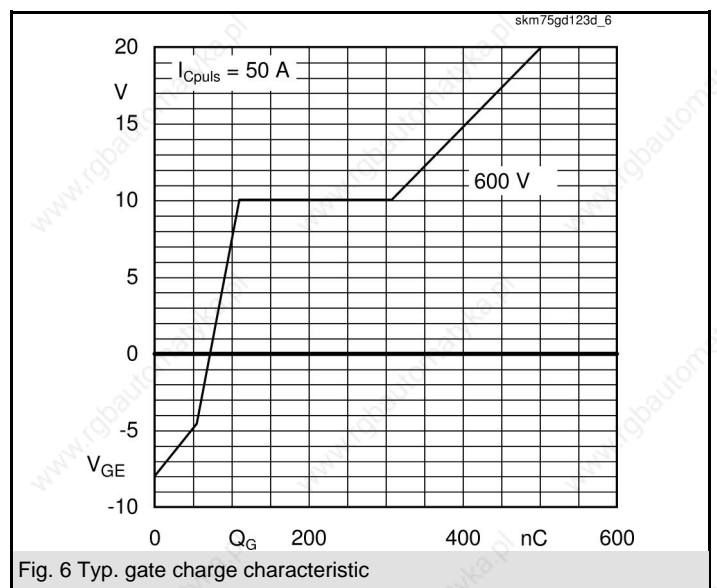
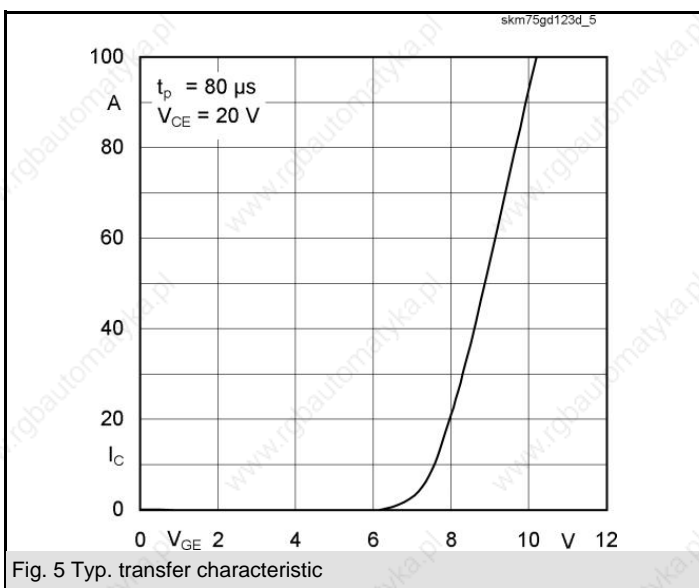
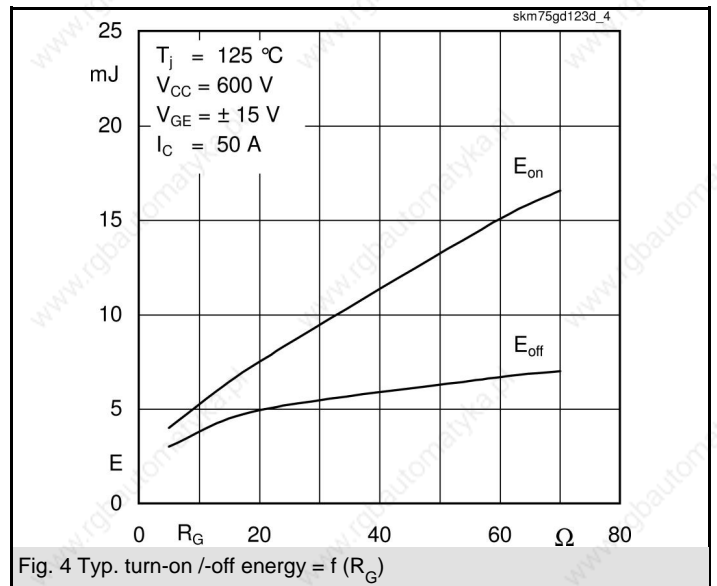
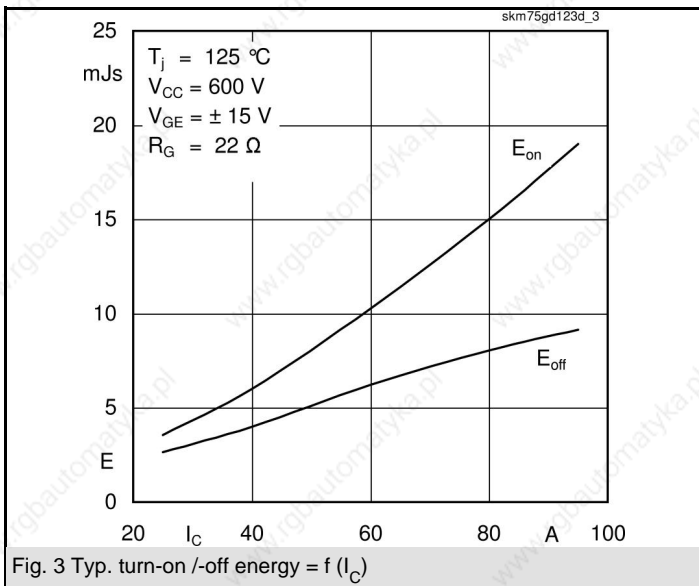
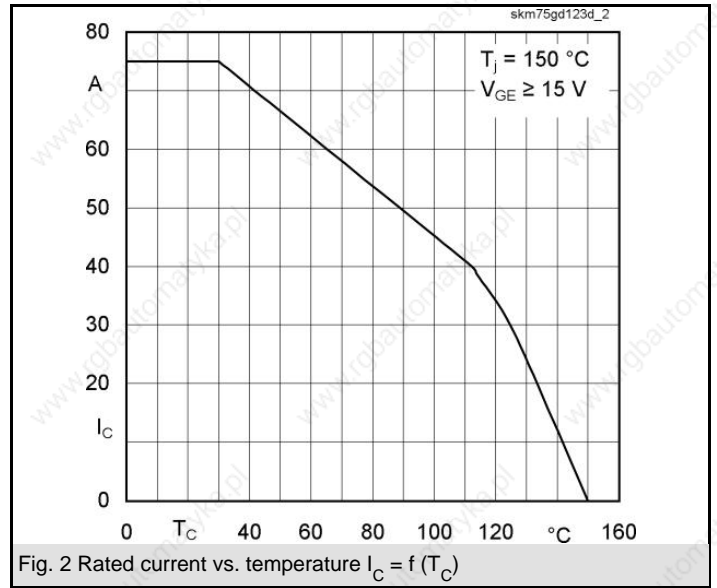
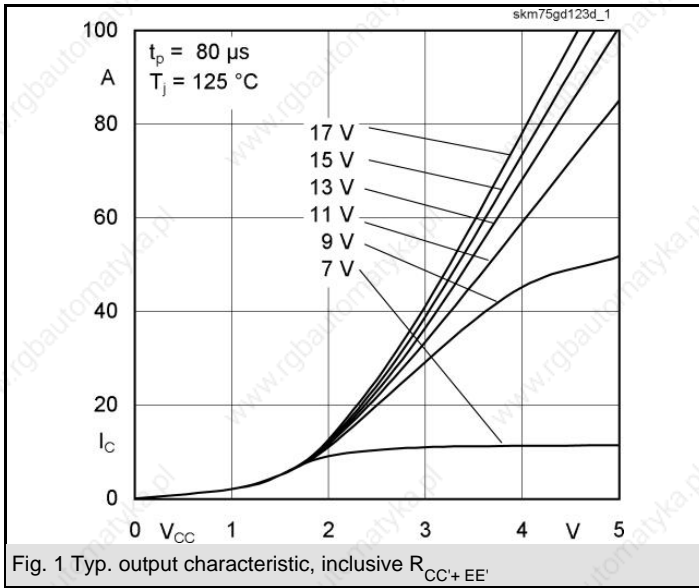


**GD**

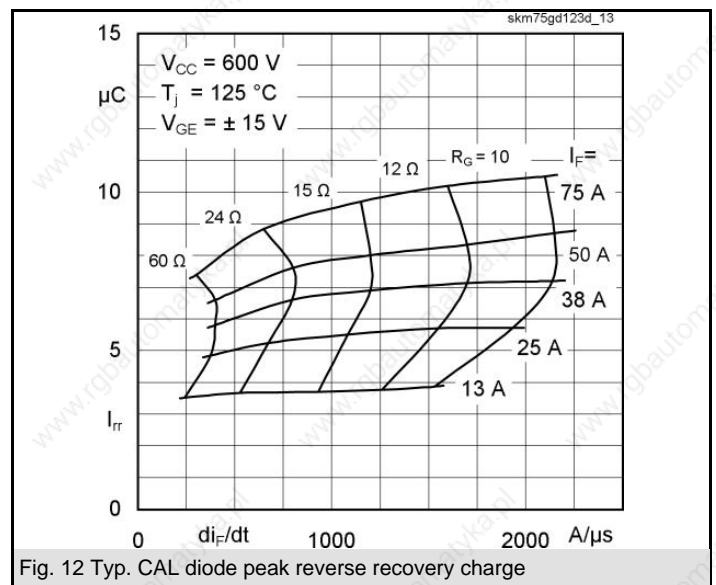
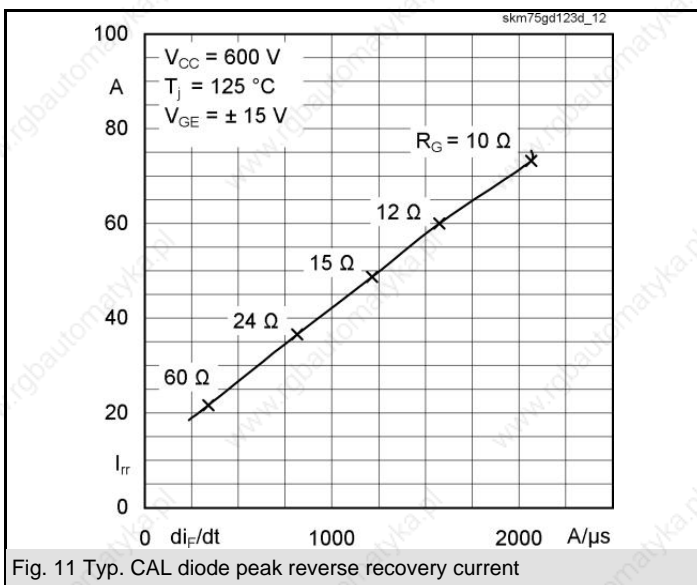
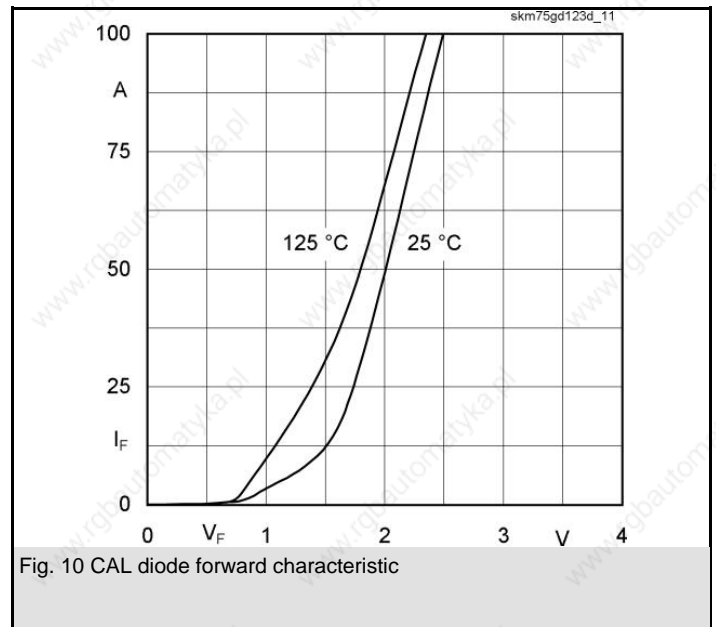
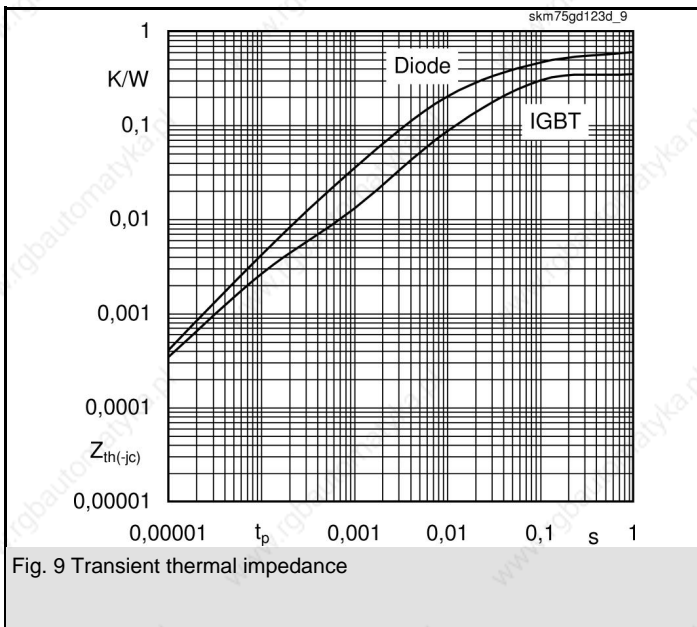
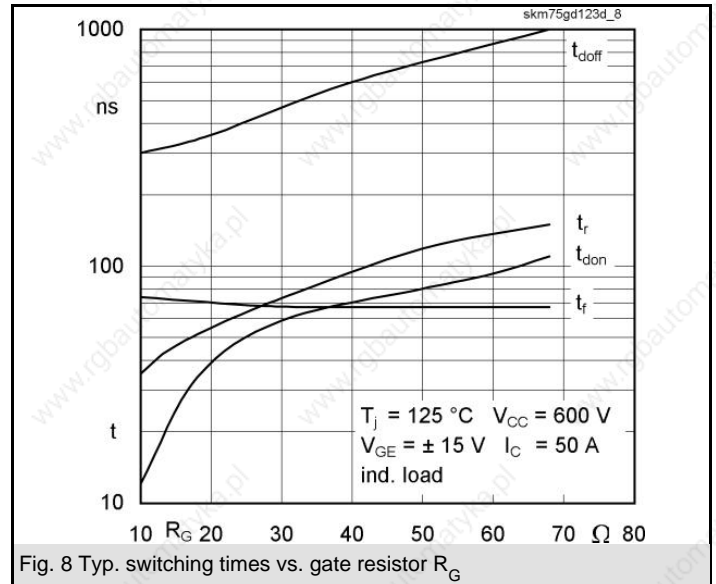
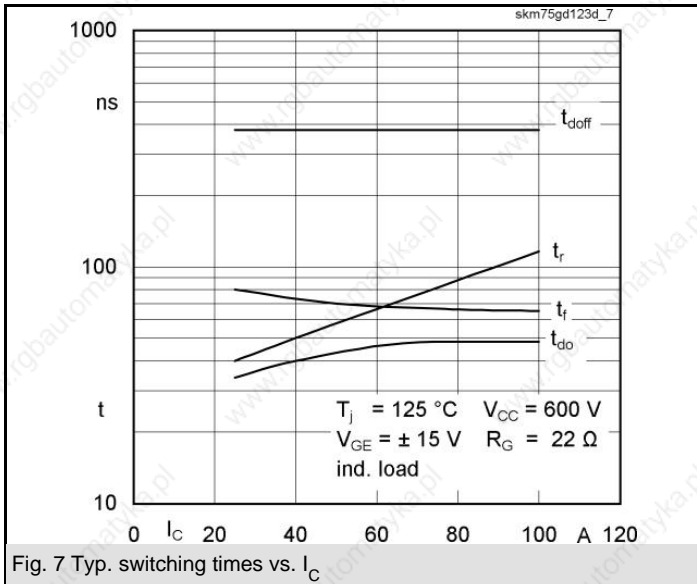
**GDL**

| $Z_{th}$<br>Symbol               | Conditions | Values | Units |
|----------------------------------|------------|--------|-------|
| <b><math>Z_{th(j-c)}</math></b>  |            |        |       |
| $R_{\theta j-c}$                 | $i = 1$    | 240    | mk/W  |
| $R_{\theta j-c}$                 | $i = 2$    | 68     | mk/W  |
| $R_{\theta j-c}$                 | $i = 3$    | 9,2    | mk/W  |
| $R_{\theta j-c}$                 | $i = 4$    | 2,8    | mk/W  |
| $\tau_{\theta j-c}$              | $i = 1$    | 0,06   | s     |
| $\tau_{\theta j-c}$              | $i = 2$    | 0,0228 | s     |
| $\tau_{\theta j-c}$              | $i = 3$    | 0,0013 | s     |
| $\tau_{\theta j-c}$              | $i = 4$    | 0,0002 | s     |
| <b><math>Z_{th(j-c)D}</math></b> |            |        |       |
| $R_{\theta j-cD}$                | $i = 1$    | 400    | mk/W  |
| $R_{\theta j-cD}$                | $i = 2$    | 168    | mk/W  |
| $R_{\theta j-cD}$                | $i = 3$    | 28     | mk/W  |
| $R_{\theta j-cD}$                | $i = 4$    | 4      | mk/W  |
| $\tau_{\theta j-cD}$             | $i = 1$    | 0,0831 | s     |
| $\tau_{\theta j-cD}$             | $i = 2$    | 0,0112 | s     |
| $\tau_{\theta j-cD}$             | $i = 3$    | 0,0013 | s     |
| $\tau_{\theta j-cD}$             | $i = 4$    | 0,08   | s     |

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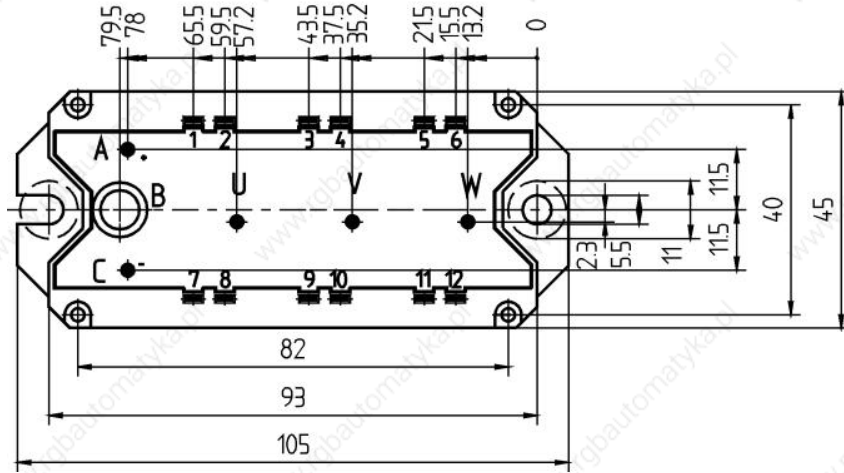
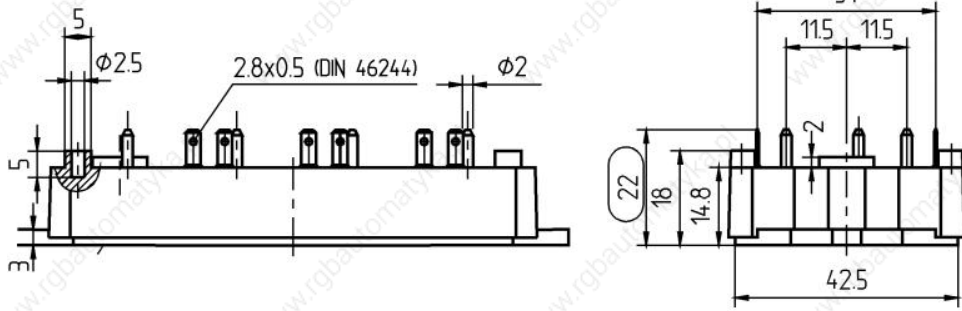


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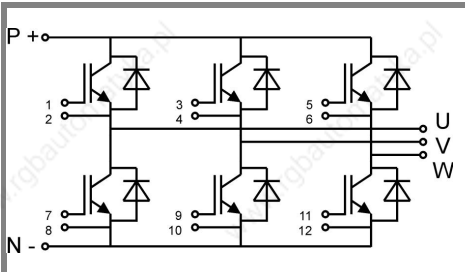
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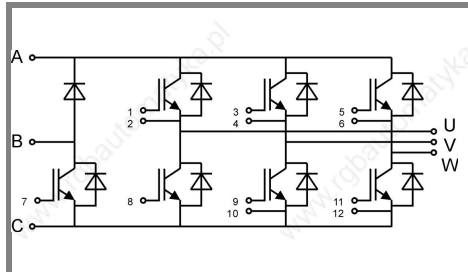


Case D 56a



Case D 67

GD



Case D 73

GDL