

SKM 100GB176D



SEMITRANS[®] 2

Trench IGBT Modules

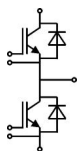
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Features

- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability, self limiting to $6 \times I_C$

Typical Applications*

- AC inverter drives mains 575 - 750 V AC
- Public transport (auxiliary syst.



GB

| Absolute Maximum Ratings | | $T_{case} = 25^\circ\text{C}$, unless otherwise specified | | |
|--------------------------|---|--|------------------|---|
| Symbol | Conditions | Values | Units | |
| IGBT | | | | |
| V_{CES} | $T_j = 25^\circ\text{C}$ | 1700 | V | |
| I_C | $T_j = 150^\circ\text{C}$ | $T_c = 25^\circ\text{C}$ | 125 | A |
| | | $T_c = 80^\circ\text{C}$ | 90 | A |
| I_{CRM} | $I_{CRM} = 2 \times I_{Cnom}$ | 150 | A | |
| V_{GES} | | ± 20 | V | |
| t_{psc} | $V_{CC} = 1200\text{ V}; V_{GE} \leq 20\text{ V}; T_j = 125^\circ\text{C}$ $V_{CES} < 1700\text{ V}$ | 10 | μs | |
| Inverse Diode | | | | |
| I_F | $T_j = 150^\circ\text{C}$ | $T_c = 25^\circ\text{C}$ | 100 | A |
| | | $T_c = 80^\circ\text{C}$ | 70 | A |
| I_{FRM} | $I_{FRM} = 2 \times I_{Fnom}$ | 150 | A | |
| I_{FSM} | $t_p = 10\text{ ms}; \sin.$ | $T_j = 150^\circ\text{C}$ | 720 | A |
| Module | | | | |
| $I_{t(RMS)}$ | | 200 | A | |
| T_{vj} | | - 40 ... +150 | $^\circ\text{C}$ | |
| T_{stg} | | - 40 ... +125 | $^\circ\text{C}$ | |
| V_{isol} | AC, 1 min. | 4000 | V | |

| Characteristics | | $T_{case} = 25^\circ\text{C}$, unless otherwise specified | | | |
|-----------------|--|---|------|------|------------------|
| Symbol | Conditions | min. | typ. | max. | Units |
| IGBT | | | | | |
| $V_{GE(th)}$ | $V_{GE} = V_{CE}, I_C = 3\text{ mA}$ | 5,2 | 5,8 | 6,4 | V |
| I_{CES} | $V_{GE} = 0\text{ V}, V_{CE} = V_{CES}$ | | | 3 | mA |
| V_{CE0} | | $T_j = 25^\circ\text{C}$ | 1 | 1,2 | V |
| | | $T_j = 125^\circ\text{C}$ | 0,9 | 1,1 | V |
| r_{CE} | $V_{GE} = 15\text{ V}$ | $T_j = 25^\circ\text{C}$ | 13 | 16,7 | $\text{m}\Omega$ |
| | | $T_j = 125^\circ\text{C}$ | 20 | 24 | $\text{m}\Omega$ |
| $V_{CE(sat)}$ | $I_{Cnom} = 75\text{ A}, V_{GE} = 15\text{ V}$ | $T_j = 25^\circ\text{C}_{chiplev.}$ | 2 | 2,45 | V |
| | | $T_j = 125^\circ\text{C}_{chiplev.}$ | 2,4 | 2,9 | V |
| C_{ies} | $V_{CE} = 25, V_{GE} = 0\text{ V}$ | $f = 1\text{ MHz}$ | 5,7 | | nF |
| C_{oes} | | | 0,28 | | nF |
| C_{res} | | | 0,22 | | nF |
| Q_G | $V_{GE} = -8\text{V}/+15\text{V}$ | | 620 | | nC |
| R_{Gint} | $T_j = 25^\circ\text{C}$ | | 8,5 | | Ω |
| $t_{d(on)}$ | $R_{Gon} = 4,2\ \Omega$ $di/dt = 1680\text{ A}/\mu\text{s}$ | $V_{CC} = 1200\text{V}$ $I_C = 75\text{A}$ | 280 | | ns |
| t_r | | | 40 | | ns |
| E_{on} | | | 44 | | mJ |
| $t_{d(off)}$ | $R_{Goff} = 4,2\ \Omega$ $di/dt = 490\text{ A}/\mu\text{s}$ | $T_j = 125^\circ\text{C}$ $V_{GE} = -15\text{V}$ $L_s = 20\text{ nH}$ | 680 | | ns |
| t_f | | | 140 | | ns |
| E_{off} | | | 28,5 | | mJ |
| $R_{th(j-c)}$ | per IGBT | | | 0,24 | K/W |

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| Characteristics | | | | | |
|----------------------|---|---|------|------|---------------|
| Symbol | Conditions | min. | typ. | max. | Units |
| Inverse Diode | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom} = 75 \text{ A}; V_{GE} = 0 \text{ V}$ | $T_j = 25 \text{ }^\circ\text{C}_{chiplev.}$ | 1,6 | 1,9 | V |
| | | $T_j = 125 \text{ }^\circ\text{C}_{chiplev.}$ | 1,6 | 1,9 | V |
| V_{F0} | | $T_j = 25 \text{ }^\circ\text{C}$ | 1,1 | 1,3 | V |
| | | $T_j = 125 \text{ }^\circ\text{C}$ | 0,9 | 1,1 | V |
| r_F | | $T_j = 25 \text{ }^\circ\text{C}$ | 6,7 | 8 | m Ω |
| | | $T_j = 125 \text{ }^\circ\text{C}$ | 9,3 | 11 | m Ω |
| I_{RRM} | $I_F = 75 \text{ A}$ | $T_j = 125 \text{ }^\circ\text{C}$ | 78,5 | | A |
| Q_{rr} | $di/dt = 1650 \text{ A}/\mu\text{s}$ | $L_S = 20 \text{ nH}$ | 29,6 | | μC |
| E_{rr} | $V_{GE} = -15 \text{ V}; V_{CC} = 1200 \text{ V}$ | | 21,4 | | mJ |
| $R_{th(j-c)D}$ | per diode | | | 0,45 | K/W |
| Module | | | | | |
| L_{CE} | | | | 30 | nH |
| R_{CC+EE} | res., terminal-chip | $T_{case} = 25 \text{ }^\circ\text{C}$ | 0,75 | | m Ω |
| | | $T_{case} = 125 \text{ }^\circ\text{C}$ | 1 | | m Ω |
| $R_{th(c-s)}$ | per module | | | 0,05 | K/W |
| M_s | to heat sink M6 | | 3 | 5 | Nm |
| M_t | to terminals M5 | | 2,5 | 5 | Nm |
| w | | | | 160 | g |

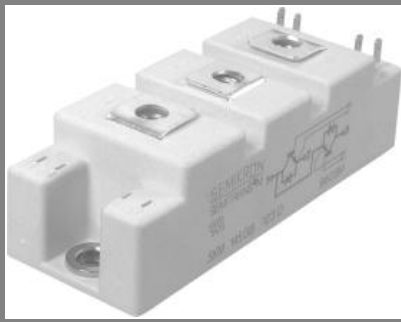
This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX.

* 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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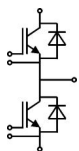
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| Z_{th} | | Values | Units |
|-----------------|------------|--------|-------|
| Symbol | Conditions | | |
| $Z_{th(j-c)I}$ | | | |
| R_{θ} | $i = 1$ | 160 | mk/W |
| R_{θ} | $i = 2$ | 60 | mk/W |
| R_{θ} | $i = 3$ | 16,5 | mk/W |
| R_{θ} | $i = 4$ | 3,5 | mk/W |
| τ_{θ} | $i = 1$ | 0,1056 | s |
| τ_{θ} | $i = 2$ | 0,009 | s |
| τ_{θ} | $i = 3$ | 0,0011 | s |
| τ_{θ} | $i = 4$ | 0,0005 | s |
| $Z_{th(j-c)D}$ | | | |
| R_{θ} | $i = 1$ | 270 | mk/W |
| R_{θ} | $i = 2$ | 139 | mk/W |
| R_{θ} | $i = 3$ | 37 | mk/W |
| R_{θ} | $i = 4$ | 4 | mk/W |
| τ_{θ} | $i = 1$ | 0,0475 | s |
| τ_{θ} | $i = 2$ | 0,0104 | s |
| τ_{θ} | $i = 3$ | 0,0011 | s |
| τ_{θ} | $i = 4$ | 0,0003 | s |

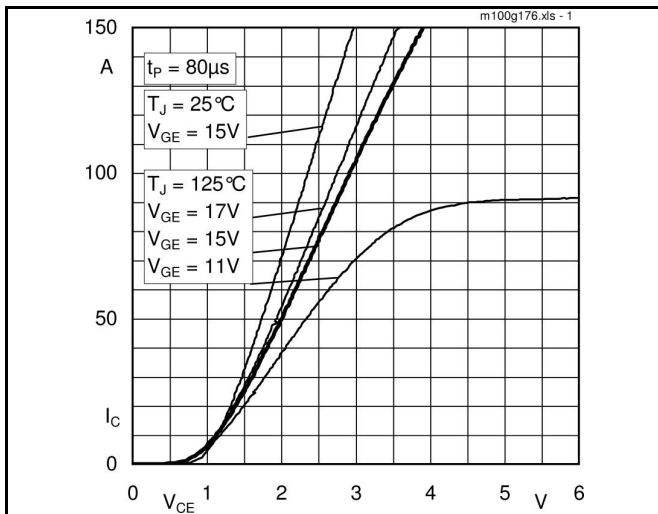


Fig. 1 Typ. output characteristic, inclusive $R_{CC+EE'}$

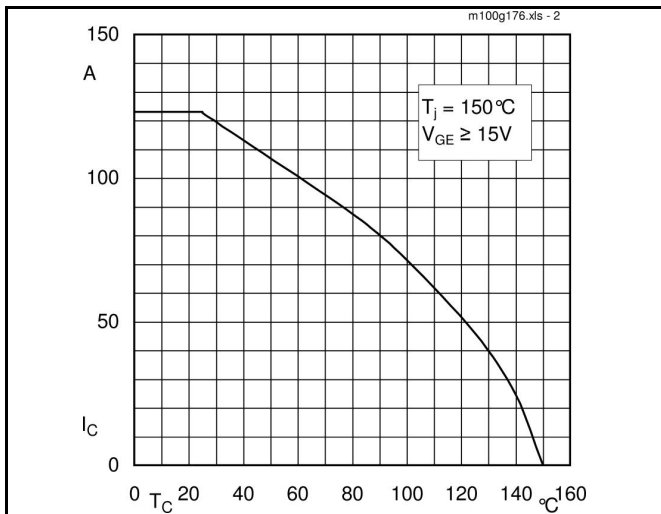


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

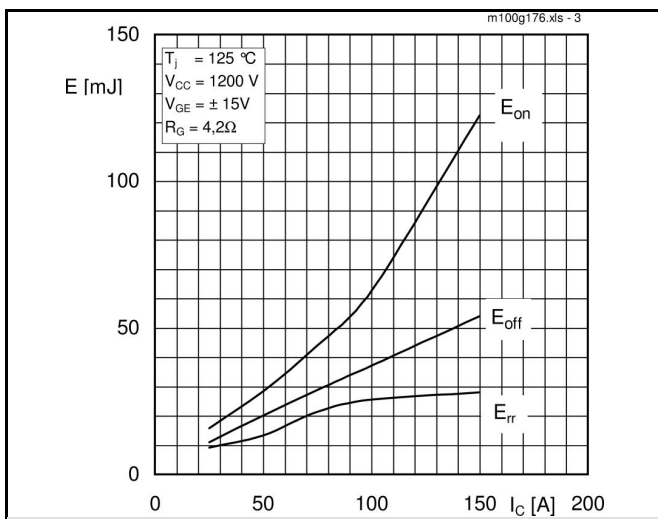


Fig. 3 Typ. turn-on /-off energy = $f(I_C)$

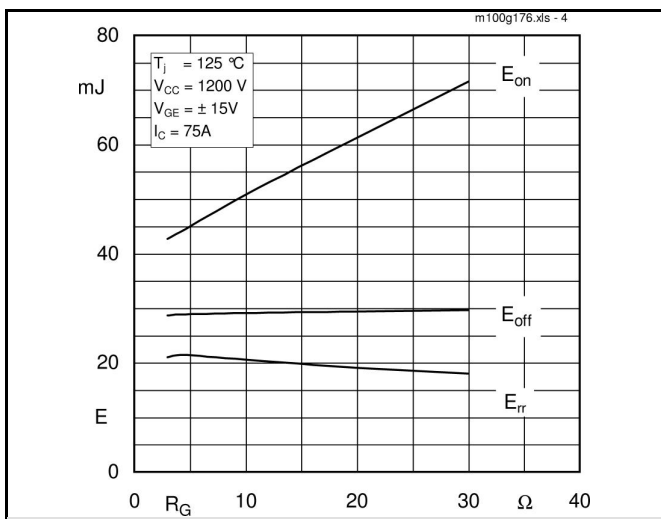


Fig. 4 Typ. turn-on /-off energy = $f(R_G)$

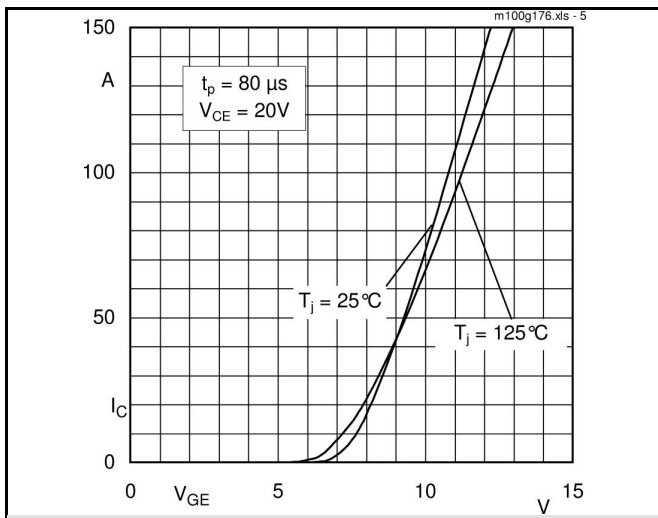


Fig. 5 Typ. transfer characteristic

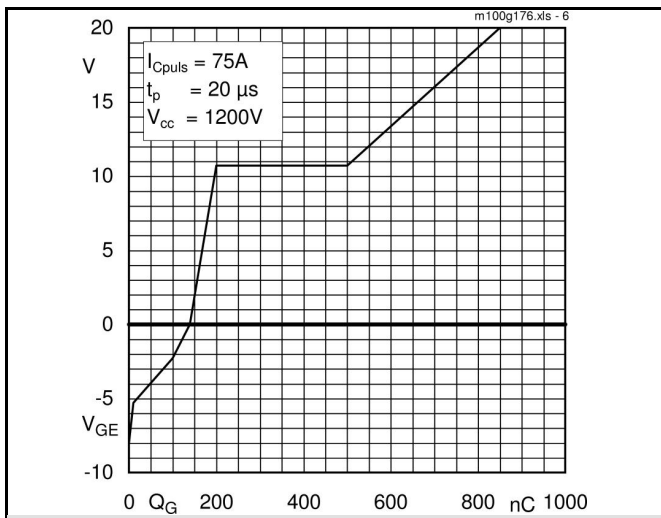
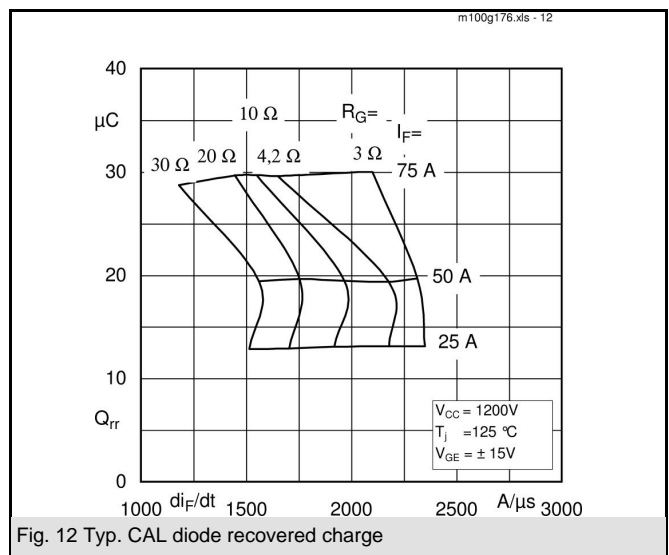
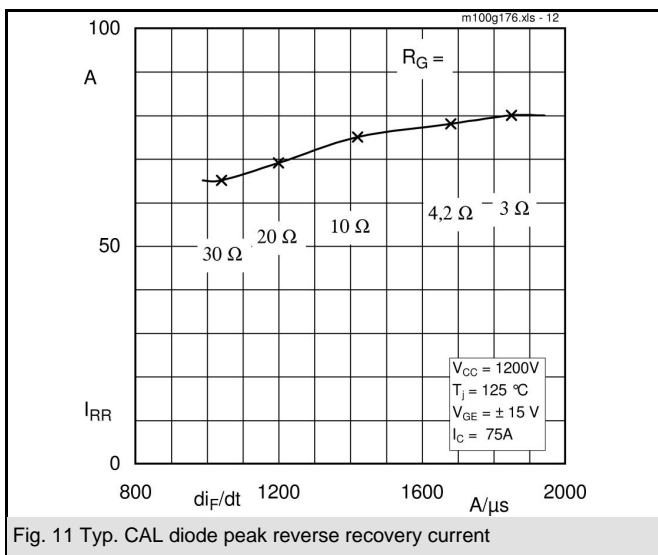
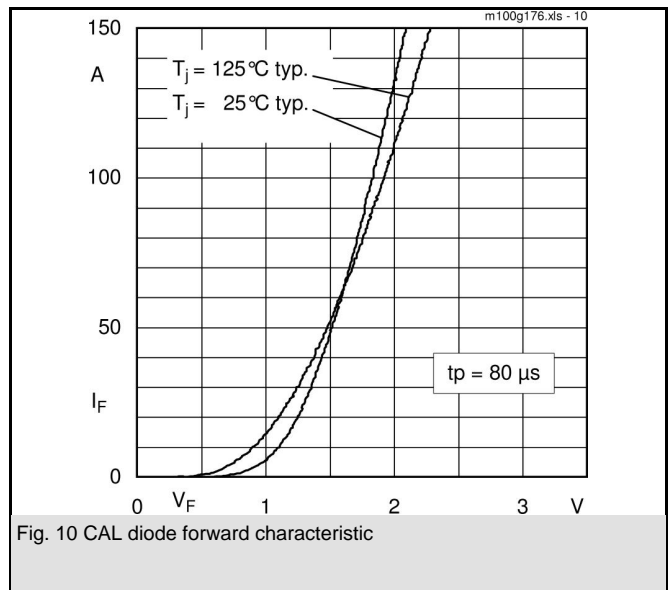
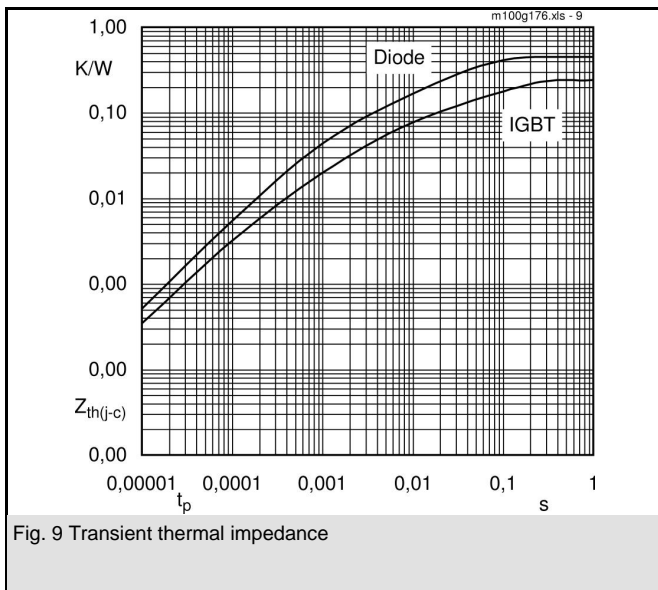
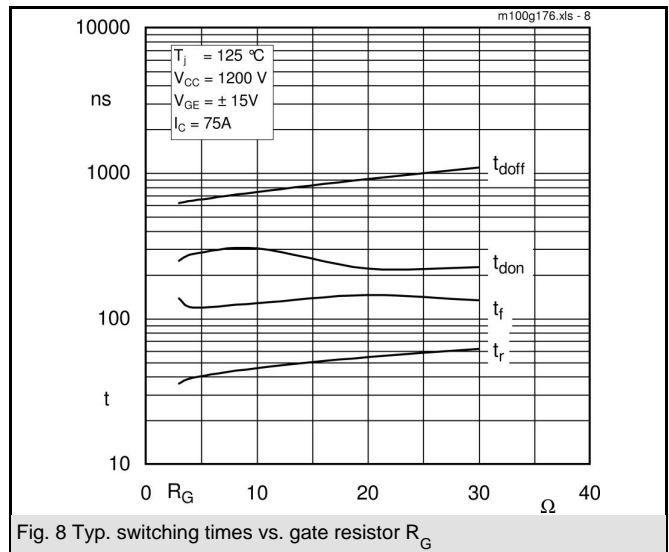
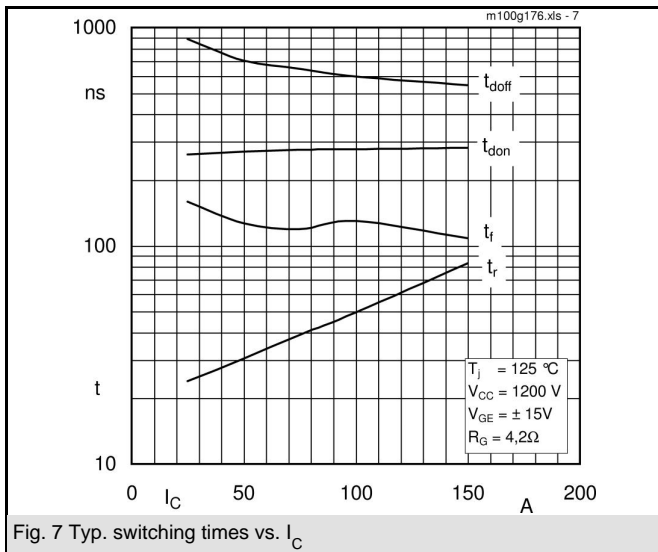


Fig. 6 Typ. gate charge characteristic

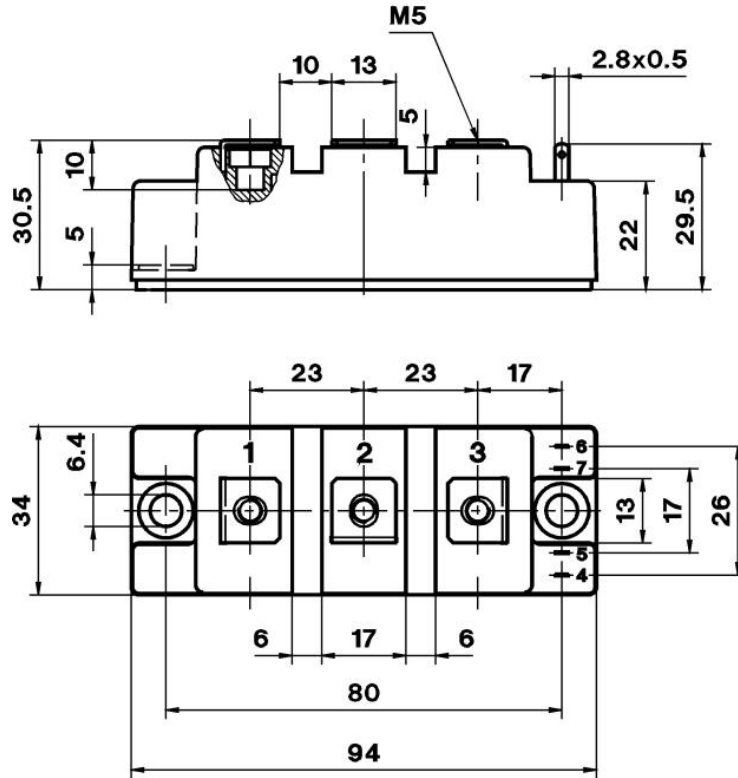


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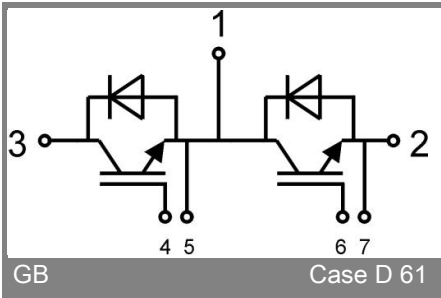
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File no. E 63 532



Case D 61



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