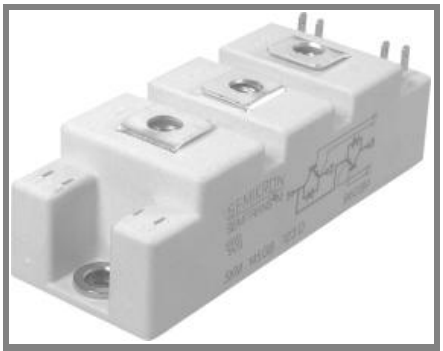
# SKM 145GB066D



**SEMITRANS® 2**

## Trench IGBT Modules

**SKM 145GB066D**

### Features

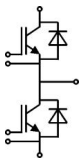
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability, self limiting to 6 x $I_C$

### Typical Applications*

- AC inverter Drives
- UPS
- Electronic welders

### Remarks

- Case temperature limited to $T_c$ = 125°C max, recomm. $T_{op}$ = -40 ... +150°C, product rel. results valid for $T_j \leq 150°C$
- SC data: $t_p \leq 6\mu s$; VGE≤15V; $T_j$=150°C; $V_{cc} \leq 360V$, use of soft $R_G$ necessary!
- Take care of over-voltage caused by stray induct.



**GB**

| **Absolute Maximum Ratings** | $T_{case}$ = 25°C, unless otherwise specified | | | |
|---|---|---|---|---|
| **Symbol** | **Conditions** | | **Values** | **Units** |
| **IGBT** | | | | |
| $V_{CES}$ | $T_j$ = 25 °C | | 600 | V |
| $I_C$ | $T_j$ = 175 °C | $T_c$ = 25 °C | 195 | A |
| | | $T_c$ = 80 °C | 150 | A |
| $I_{CRM}$ | $I_{CRM}$=2x$I_{Cnom}$ | | 300 | A |
| $V_{GES}$ | | | ± 20 | V |
| $t_{psc}$ | $V_{CC}$ = 360 V; $V_{GE} \leq$ 15 V; $V_{CES}$ < 600 V | $T_j$ = 150 °C | 6 | µs |
| **Inverse Diode** | | | | |
| $I_F$ | $T_j$ = 175 °C | $T_c$ = 25 °C | 150 | A |
| | | $T_c$ = 80 °C | 100 | A |
| $I_{FRM}$ | $I_{FRM}$=2x$I_{Fnom}$ | | 300 | A |
| $I_{FSM}$ | $t_p$ = 10 ms; sin. | $T_j$ = 175 °C | 880 | A |
| **Module** | | | | |
| $I_{t(RMS)}$ | | | 200 | A |
| $T_{vj}$ | | | - 40 ... + 175 | °C |
| $T_{stg}$ | | | - 40 ... + 125 | °C |
| $V_{isol}$ | AC, 1 min. | | 4000 | V |

| **Characteristics** | $T_{case}$ = 25°C, unless otherwise specified | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Conditions** | | **min.** | **typ.** | **max.** | **Units** |
| **IGBT** | | | | | | |
| $V_{GE(th)}$ | $V_{GE}$ = $V_{CE}$, $I_C$ = 2,4 mA | | 5 | 5,8 | 6,5 | V |
| $I_{CES}$ | $V_{GE}$ = 0 V, $V_{CE}$ = $V_{CES}$ | $T_j$ = 25 °C | | 0,08 | 0,25 | mA |
| $V_{CE0}$ | | $T_j$ = 25 °C | | 0,9 | 1 | V |
| | | $T_j$ = 150 °C | | 0,85 | 0,9 | V |
| $r_{CE}$ | $V_{GE}$ = 15 V | $T_j$ = 25°C | | 3,7 | 6 | mΩ |
| | | $T_j$ = 150°C | | 5,7 | 8 | mΩ |
| $V_{CE(sat)}$ | $I_{Cnom}$ = 150 A, $V_{GE}$ = 15 V | $T_j$ = 25°C$_{chiplev.}$ | | 1,45 | 1,9 | V |
| | | $T_j$ = 150°C$_{chiplev.}$ | | 1,7 | 2,1 | V |
| $C_{ies}$ | $V_{CE}$ = 25, $V_{GE}$ = 0 V | f = 1 MHz | | 9,25 | | nF |
| $C_{oes}$ | | | | 0,6 | | nF |
| $C_{res}$ | | | | 0,28 | | nF |
| $Q_G$ | $V_{GE}$ = -8V...+15V | | | 1100 | | nC |
| $R_{Gint}$ | $T_j$ = °C | | | 2 | | Ω |
| $t_{d(on)}$ | $R_{Gon}$ = 4,3 Ω | $V_{CC}$ = 300V | | 150 | | ns |
| $t_r$ | | $I_C$= 150A | | 52 | | ns |
| $E_{on}$ | | $T_j$ = 150 °C | | 8,5 | | mJ |
| $t_{d(off)}$ | $R_{Goff}$ = 4,3 Ω | $V_{GE}$ = -8/+15V | | 490 | | ns |
| $t_f$ | | | | 46 | | ns |
| $E_{off}$ | | | | 5,5 | | mJ |
| $R_{th(j-c)}$ | per IGBT | | | | 0,3 | K/W |

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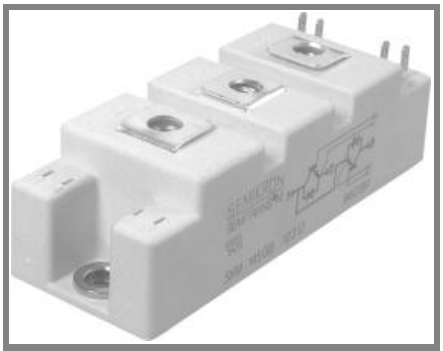

**SEMITRANS® 2**

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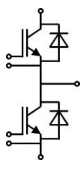
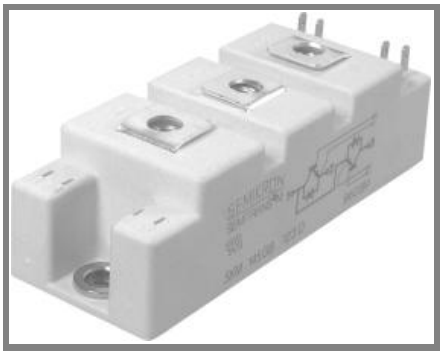


**GB**

| Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Conditions** | | **min.** | **typ.** | **max.** | **Units** |
| **Inverse Diode** | | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom}$ = 150 A; $V_{GE}$ = 0 V | $T_j$ = 25 °$C_{chiplev.}$ | | 1,4 | 1,6 | V |
| | | $T_j$ = 150 °$C_{chiplev.}$ | | | | V |
| $V_{F0}$ | | $T_j$ = 25 °C | | 0,95 | 1 | V |
| $r_F$ | | $T_j$ = 25 °C | | 3 | 4 | mΩ |
| $I_{RRM}$ | $I_F$ = 150 A | $T_j$ = 150 °C | | 90 | | A |
| $Q_{rr}$ | di/dt = 2100 A/µs | | | 20 | | µC |
| $E_{rr}$ | $V_{GE}$ = -8 V; $V_{CC}$ = 300 V | | | 3,5 | | mJ |
| $R_{th(j-c)D}$ | per diode | | | | 0,5 | K/W |
| **Module** | | | | | | |
| $L_{CE}$ | | | | | 30 | nH |
| $R_{CC'+EE'}$ | res., terminal-chip | $T_{case}$= 25 °C | | 0,75 | | mΩ |
| | | $T_{case}$= 125 °C | | 1 | | mΩ |
| $R_{th(c-s)}$ | 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 | | | | | 150 | 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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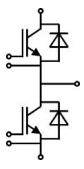

**GB**

| $Z_{th}$ Symbol | Conditions | Values | Units |
|---|---|---|---|
| **$Z_{th(j-c)I}$** | | | |
| $R_i$ | i = 1 | 220 | mk/W |
| $R_i$ | i = 2 | 60 | mk/W |
| $R_i$ | i = 3 | 16,5 | mk/W |
| $R_i$ | i = 4 | 3,5 | mk/W |
| $tau_i$ | i = 1 | 0,0447 | s |
| $tau_i$ | i = 2 | 0,0223 | s |
| $tau_i$ | i = 3 | 0,0015 | s |
| $tau_i$ | i = 4 | 0,0002 | s |
| **$Z_{th(j-c)D}$** | | | |
| $R_i$ | i = 1 | 330 | mk/W |
| $R_i$ | i = 2 | 137 | mk/W |
| $R_i$ | i = 3 | 28 | mk/W |
| $R_i$ | i = 4 | 5 | mk/W |
| $tau_i$ | i = 1 | 0,05 | s |
| $tau_i$ | i = 2 | 0,0129 | s |
| $tau_i$ | i = 3 | 0,002 | s |
| $tau_i$ | i = 4 | 0,0002 | s |

 

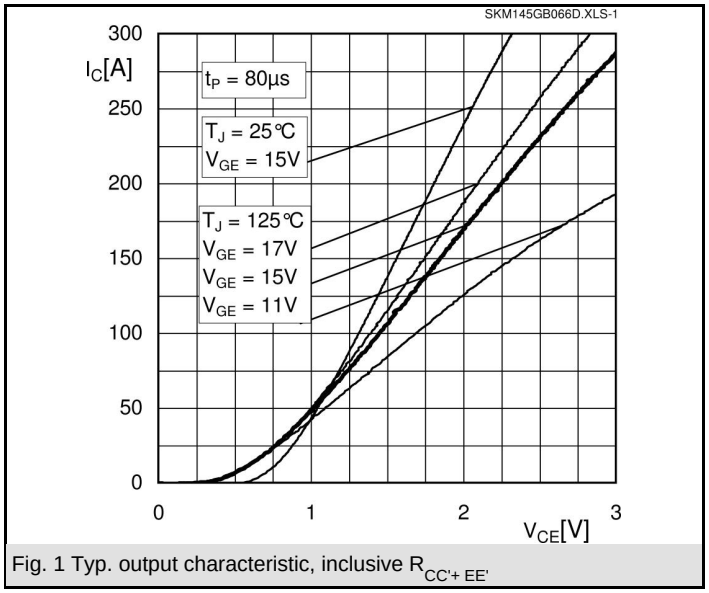


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

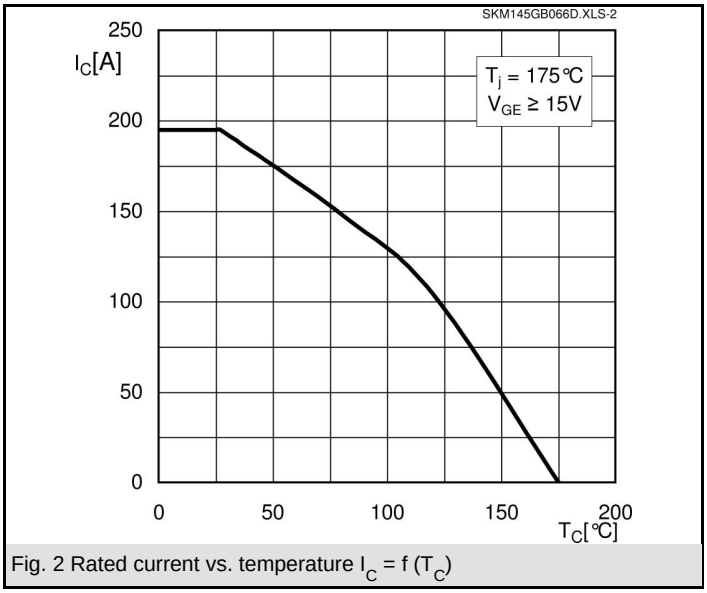


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

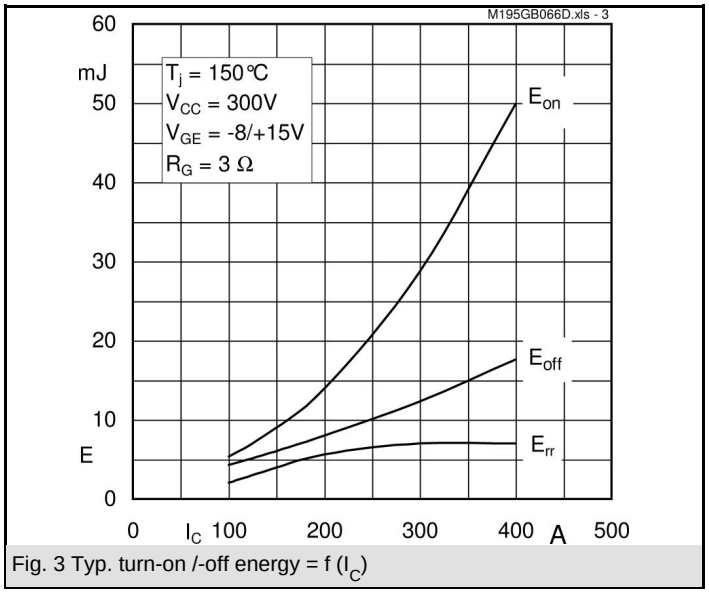


Fig. 3 Typ. turn-on /-off energy = f ($I_C$)

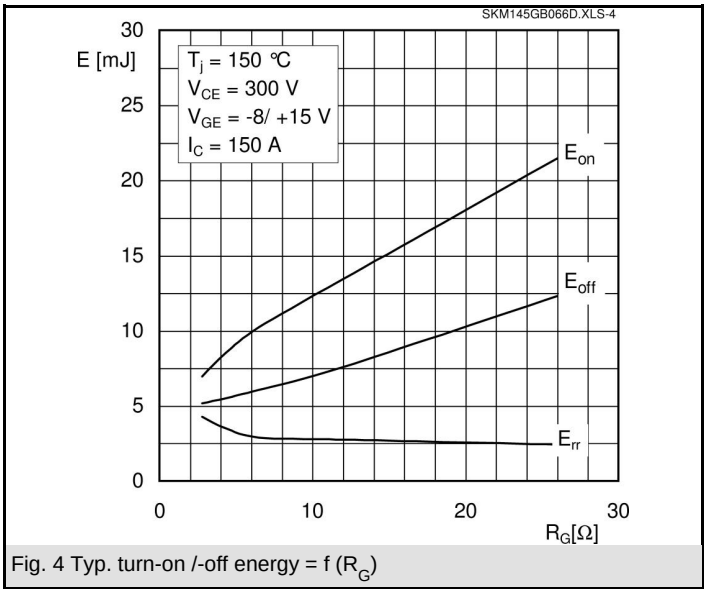


Fig. 4 Typ. turn-on /-off energy = f ($R_G$)

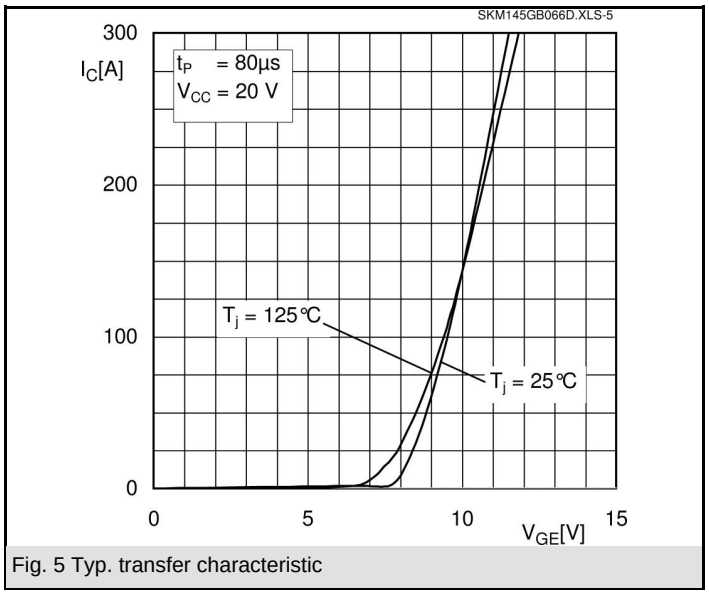


Fig. 5 Typ. transfer characteristic

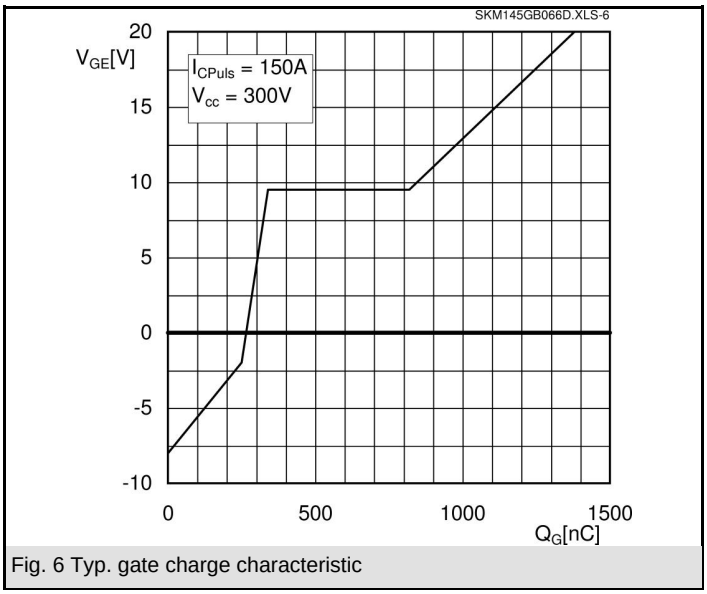


Fig. 6 Typ. gate charge characteristic

 

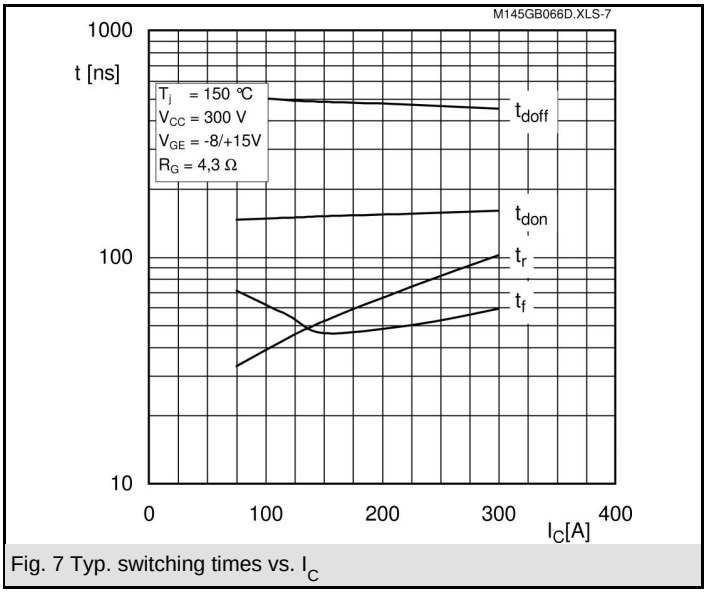


Fig. 7 Typ. switching times vs. $I_C$

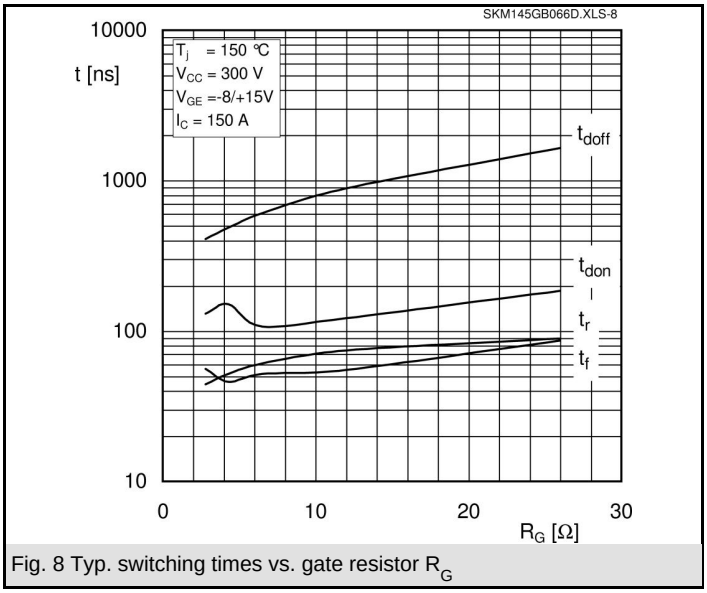


Fig. 8 Typ. switching times vs. gate resistor $R_G$

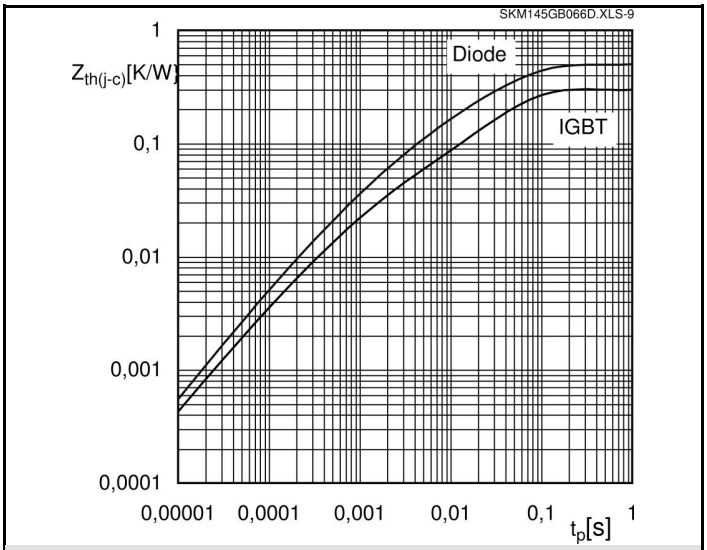


Fig. 9 Transient thermal impedance of IGBT and Diode

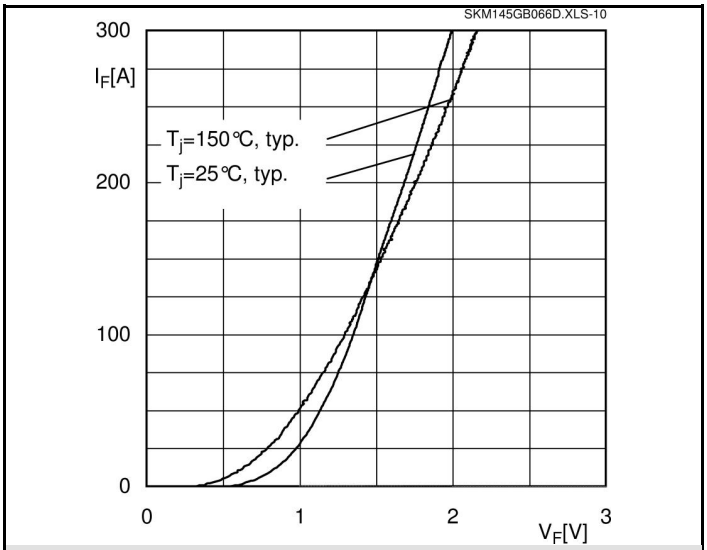


Fig. 10 CAL diode forward characteristic

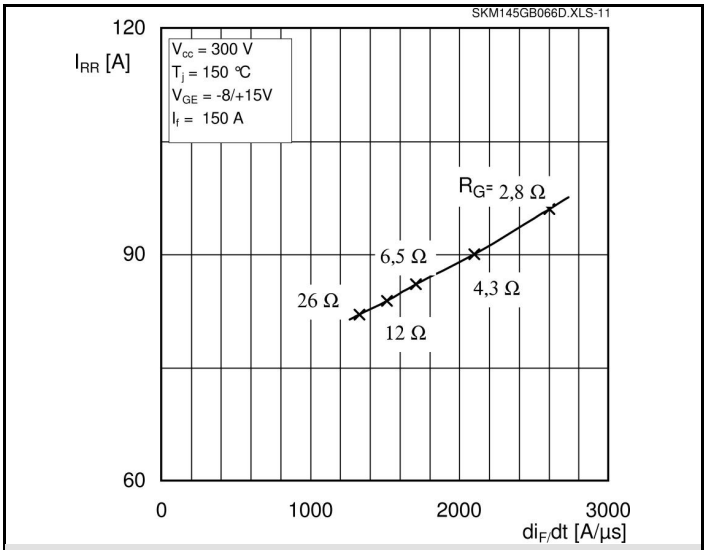


Fig. 11Typ. CAL diode peak reverse recovery current

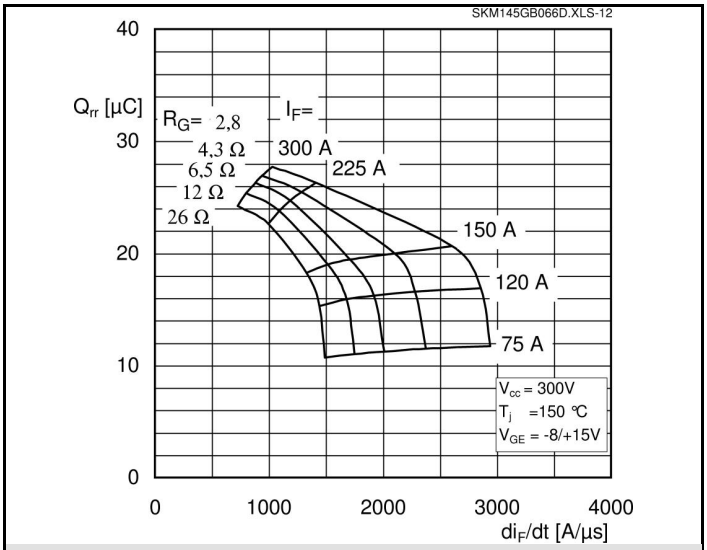


Fig. 12 Typ. CAL recovered charge

 

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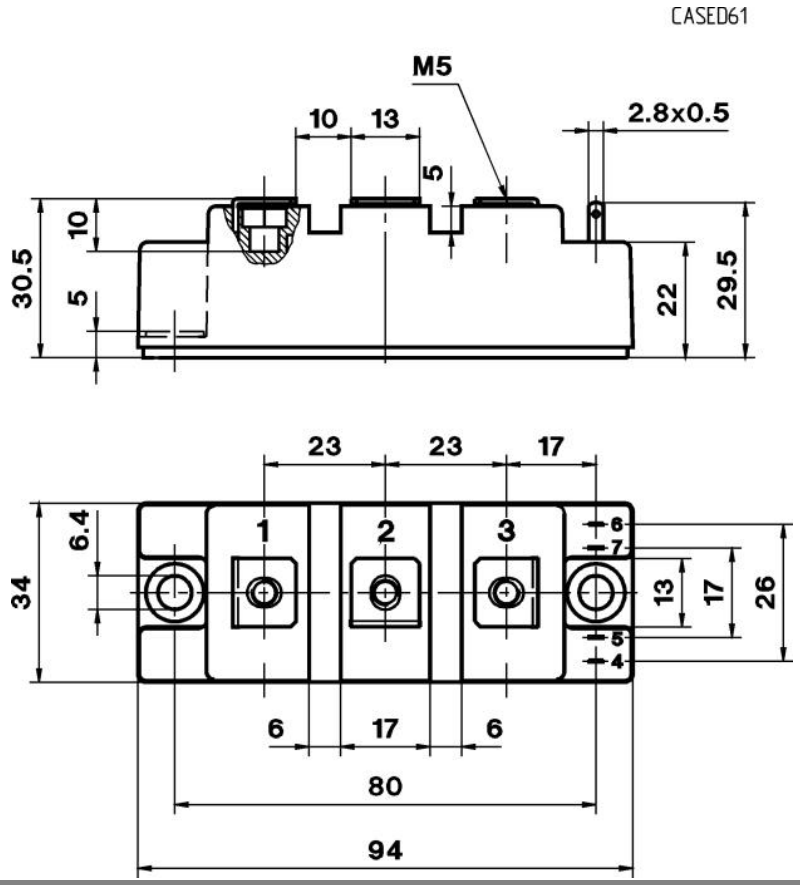
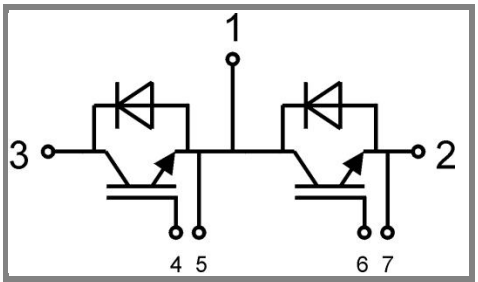



Case D 61




GB Case D61