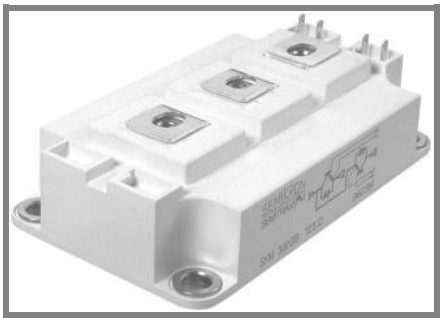
# SKM 300GB123D



**SEMITRANS® 3**

## IGBT Modules

**SKM 300GB123D**

**SKM 300GAL123D**

**SKM 300GAR123D**

### Features

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- Low inductance case
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- High short circuit capability, self limiting to 6 x $I_{cnom}$
- Latch-up free
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### Typical Applications*

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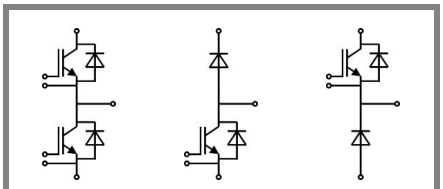
- UPS



GB GAL GAR

| **Absolute Maximum Ratings** | | | $T_c$ = 25 °C, unless otherwise specified | |
|---|---|---|---|---|
| **Symbol** | **Conditions** | | **Values** | **Units** |
| **IGBT** | | | | |
| $V_{CES}$ | $T_j$ = 25 °C | | 1200 | V |
| $I_C$ | $T_j$ = 150 °C | $T_{case}$ = 25 °C | 300 | A |
| | | $T_{case}$ = 80 °C | 220 | A |
| $I_{CRM}$ | $I_{CRM}$=2x$I_{Cnom}$ | | 400 | A |
| $V_{GES}$ | | | ± 20 | V |
| $t_{psc}$ | $V_{CC}$ = 600 V; $V_{GE} \leq$ 20 V; $V_{CES}$ < 1200 V | $T_j$ = 125 °C | 10 | µs |
| **Inverse Diode** | | | | |
| $I_F$ | $T_j$ = 150 °C | $T_{case}$ = 25 °C | 260 | A |
| | | $T_{case}$ = 80 °C | 180 | A |
| $I_{FRM}$ | $I_{FRM}$=2x$I_{Fnom}$ | | 400 | A |
| $I_{FSM}$ | $t_p$ = 10 ms; sin. | $T_j$ = 150 °C | 2200 | A |
| **Freewheeling Diode** | | | | |
| $I_F$ | $T_j$ = 150 °C | $T_{case}$ = 25 °C | 350 | A |
| | | $T_{case}$ = 80 °C | 230 | A |
| $I_{FRM}$ | $I_{FRM}$=2x$I_{Fnom}$ | | 600 | A |
| $I_{FSM}$ | $t_p$ = 10 ms; sin | $T_j$ = 150 °C | 2900 | A |
| **Module** | | | | |
| $I_{t(RMS)}$ | | | 500 | A |
| $T_{vj}$ | | | - 40...+ 150 | °C |
| $T_{stg}$ | | | - 40...+ 125 | °C |
| $V_{isol}$ | AC, 1 min. | | 2500 | V |

| **Characteristics** | | | $T_c$ = 25 °C, unless otherwise specified | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Conditions** | | **min.** | **typ.** | **max.** | **Units** |
| **IGBT** | | | | | | |
| $V_{GE(th)}$ | $V_{GE}$ = $V_{CE}$, $I_C$ = 8 mA | | 4,5 | 5,5 | 6,5 | V |
| $I_{CES}$ | $V_{GE}$ = 0 V, $V_{CE}$ = $V_{CES}$ | $T_j$ = 25 °C | | 0,1 | 0,3 | mA |
| $V_{CE0}$ | | $T_j$ = 25 °C | | 1,4 | 1,6 | V |
| | | $T_j$ = 125 °C | | 1,6 | 1,8 | V |
| $r_{CE}$ | $V_{GE}$ = 15 V | $T_j$ = 25°C | | 5,5 | 7 | mΩ |
| | | $T_j$ = 125°C | | 7,5 | 9,5 | mΩ |
| $V_{CE(sat)}$ | $I_{Cnom}$ = 200 A, $V_{GE}$ = 15 V | $T_j$ = 25°C$_{chiplev.}$ | | 2,5 | 3 | V |
| | | $T_j$ = 125°C$_{chiplev.}$ | | 3,1 | 3,7 | V |
| $C_{ies}$ | $V_{CE}$ = 25, $V_{GE}$ = 0 V | f = 1 MHz | | 18 | 24 | nF |
| $C_{oes}$ | | | | 2,5 | 3,2 | nF |
| $C_{res}$ | | | | 1 | 1,3 | nF |
| $Q_G$ | -8V - +20V | | | 2000 | | nC |
| $R_{Gint}$ | $T_j$ = °C | | | 2,5 | | Ω |
| $t_{d(on)}$ | $R_{Gon}$ = 4,7 Ω | $V_{CC}$ = 600V | | 250 | 400 | ns |
| $t_r$ | | $I_C$= 200A | | 90 | 160 | ns |
| $E_{on}$ | | $T_j$ = 125 °C | | 28 | | mJ |
| $t_{d(off)}$ | $R_{Goff}$ = 4,7 Ω | | | 550 | 700 | ns |
| $t_f$ | | | | 70 | 100 | ns |
| $E_{off}$ | | | | 26 | | mJ |
| $R_{th(j-c)}$ | per IGBT | | | | 0,075 | K/W |

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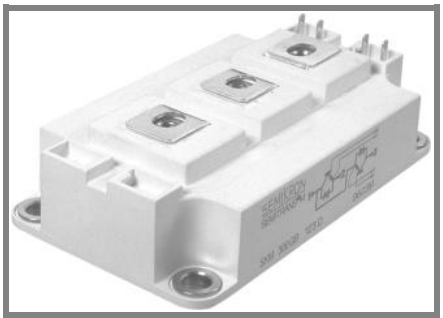

**SEMITRANS® 3**

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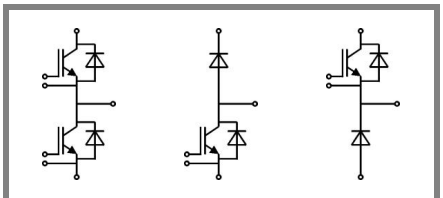


**GB** **GAL** **GAR**

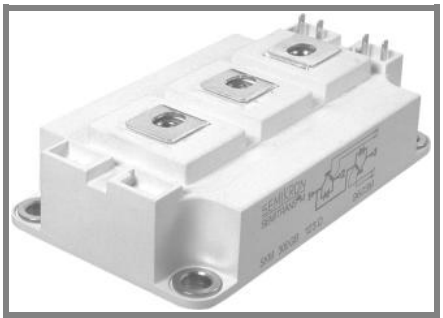
| Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Conditions** | | **min.** | **typ.** | **max.** | **Units** |
| **Inverse Diode** | | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom}$ = 200 A; $V_{GE}$ = 0 V | $T_j$ = 25 °C$_{chiplev.}$ | | 2 | 2,5 | V |
| $V_{F0}$ | | $T_j$ = 25 °C | | 1,1 | 1,2 | V |
| | | $T_j$ = 125 °C | | | | V |
| $r_F$ | | $T_j$ = 25 °C | | 4,5 | 6,5 | mΩ |
| | | $T_j$ = 125 °C | | | | mΩ |
| $I_{RRM}$ | $I_F$ = 200 A | $T_j$ = 125 °C | | 105 | | A |
| $Q_{rr}$ | di/dt = 4000 A/µs | | | 10 | | µC |
| $E_{rr}$ | $V_{GE}$ = 0 V; $V_{CC}$ = 600 V | | | | | mJ |
| $R_{th(j-c)D}$ | per diode | | | | 0,18 | K/W |
| **Freewheeling Diode** | | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom}$ = 300 A; $V_{GE}$ = 0 V | $T_j$ = 25 °C$_{chiplev.}$ | | 2 | 2,5 | V |
| $V_{F0}$ | | $T_j$ = 25 °C | | 1,1 | 1,2 | V |
| | | $T_j$ = 125 °C | | | | V |
| $r_F$ | | $T_j$ = 25 °C | | 3 | 4,3 | V |
| | | $T_j$ = 125 °C | | | | V |
| $I_{RRM}$ | $I_F$ = 200 A | $T_j$ = 125 °C | | 140 | | A |
| $Q_{rr}$ | di/dt = 3500 A/µs | | | 34 | | µC |
| $E_{rr}$ | $V_{GE}$ = 0 V; $V_{CC}$ = 600 V | | | | | mJ |
| $R_{th(j-c)FD}$ | per diode | | | | 0,15 | K/W |
| **Module** | | | | | | |
| $L_{CE}$ | | | | 15 | 20 | nH |
| $R_{CC'+EE'}$ | res., terminal-chip | $T_{case}$= 25 °C | | 0,35 | | mΩ |
| | | $T_{case}$= 125 °C | | 0,5 | | mΩ |
| $R_{th(c-s)}$ | per module | | | | 0,038 | K/W |
| $M_s$ | to heat sink M6 | | 3 | | 5 | Nm |
| $M_t$ | to terminals M6 | | 2,5 | | 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 300GB123D



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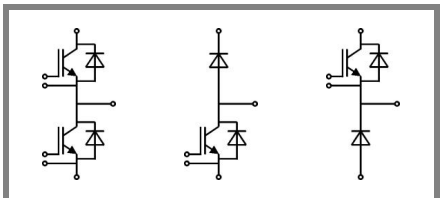


**GB** **GAL** **GAR**

| $Z_{th}$ Symbol | Conditions | Values | Units |
|---|---|---|---|
| **$Z_{th(j-c)I}$** | | | |
| $R_i$ | i = 1 | 53 | mk/W |
| $R_i$ | i = 2 | 18,5 | mk/W |
| $R_i$ | i = 3 | 3,1 | mk/W |
| $R_i$ | i = 4 | 0,4 | mk/W |
| $tau_i$ | i = 1 | 0,04 | s |
| $tau_i$ | i = 2 | 0,0189 | s |
| $tau_i$ | i = 3 | 0,0017 | s |
| $tau_i$ | i = 4 | 0,003 | s |
| **$Z_{th(j-c)D}$** | | | |
| $R_i$ | i = 1 | 0,1151 | mk/W |
| $R_i$ | i = 2 | 0,0525 | mk/W |
| $R_i$ | i = 3 | 0,0111 | mk/W |
| $R_i$ | i = 4 | 0,0022 | mk/W |
| $tau_i$ | i = 1 | 0,0366 | s |
| $tau_i$ | i = 2 | 0,0113 | s |
| $tau_i$ | i = 3 | 0,003 | s |
| $tau_i$ | i = 4 | 0,0002 | s |

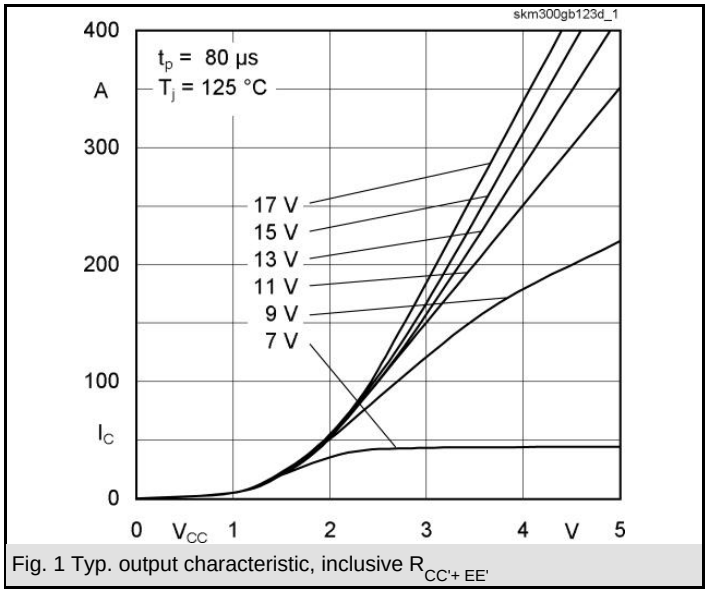



Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

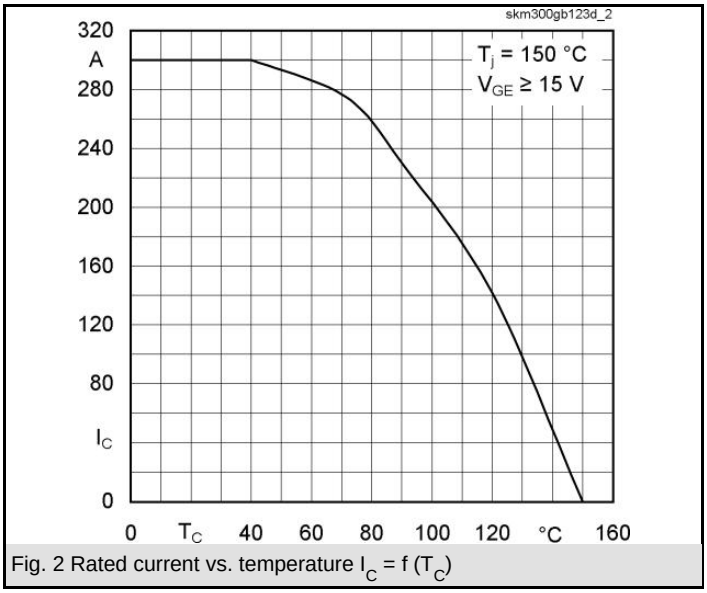



Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

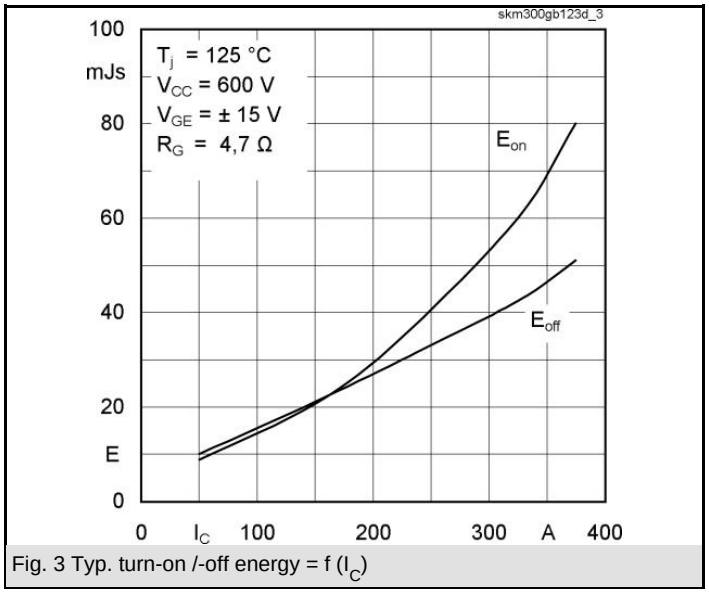



Fig. 3 Typ. turn-on /-off energy = f ($I_C$)

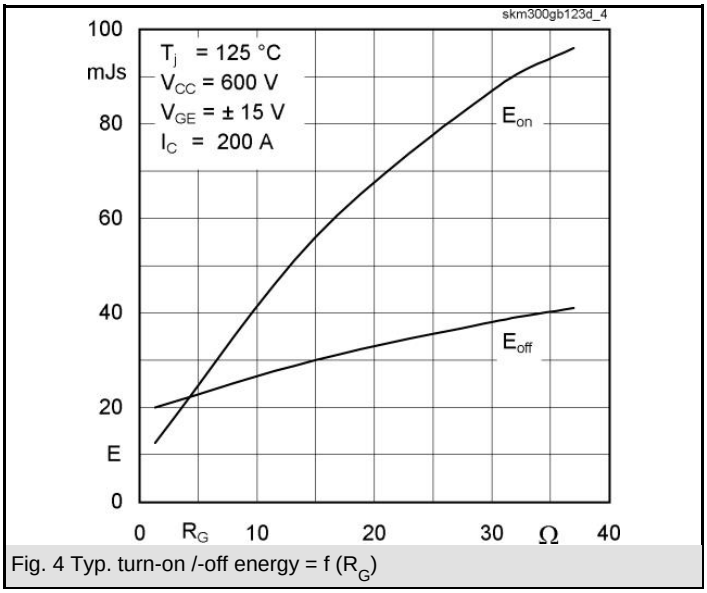



Fig. 4 Typ. turn-on /-off energy = f ($R_G$)

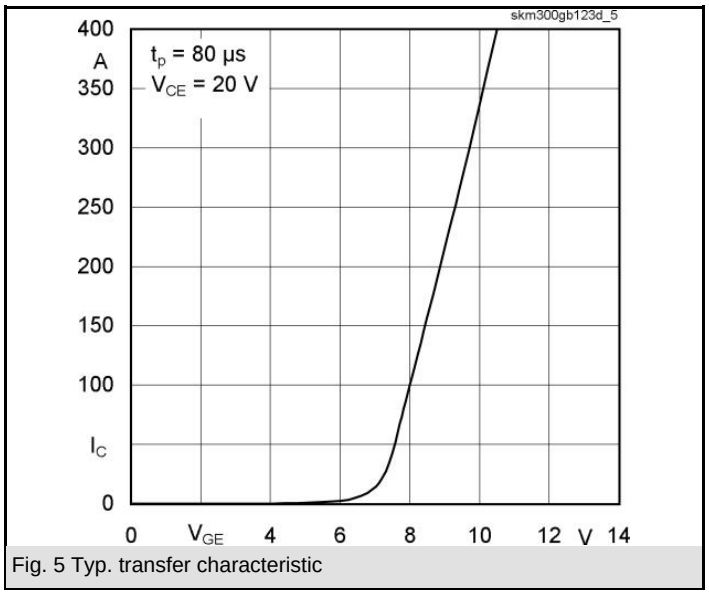



Fig. 5 Typ. transfer characteristic

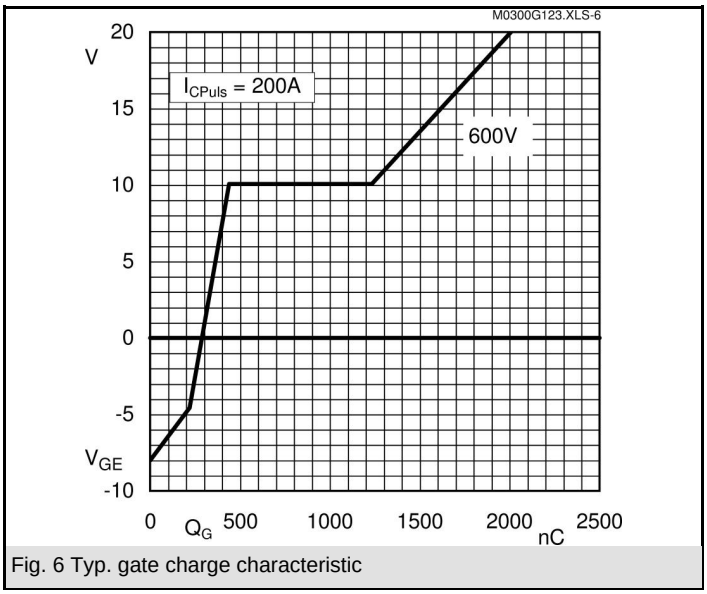



Fig. 6 Typ. gate charge characteristic

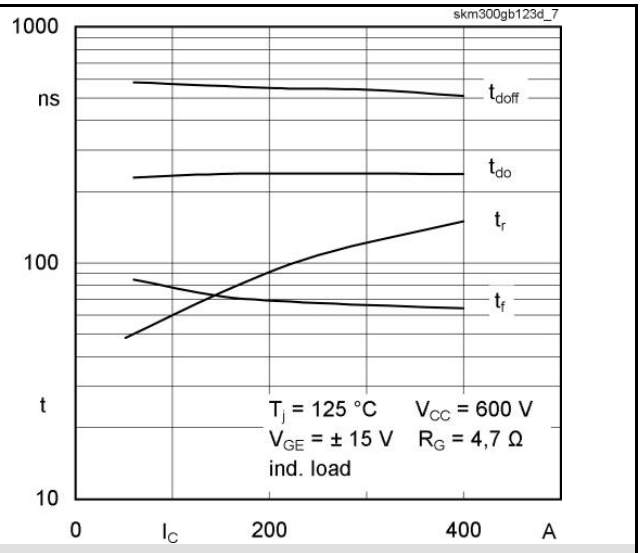



Fig. 7 Typ. switching times vs. $I_C$

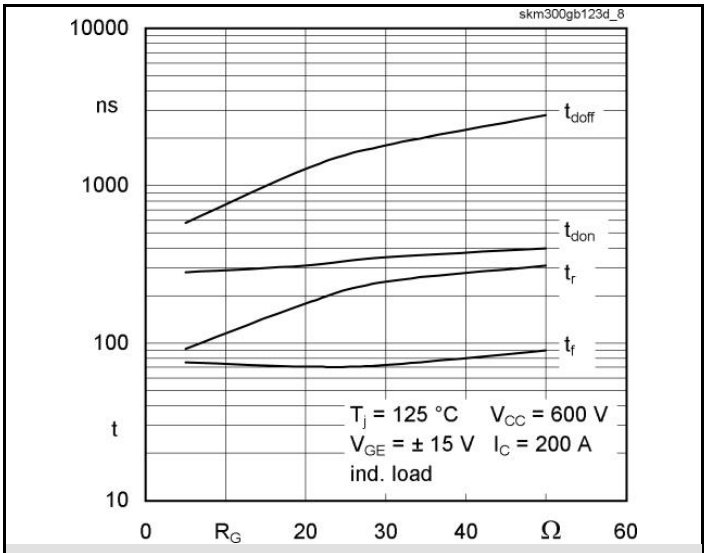



Fig. 8 Typ. switching times vs. gate resistor $R_G$

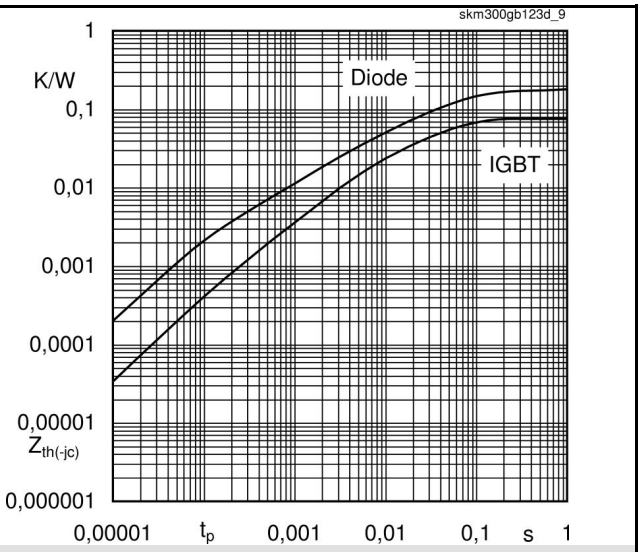



Fig. 9 Transient thermal impedance

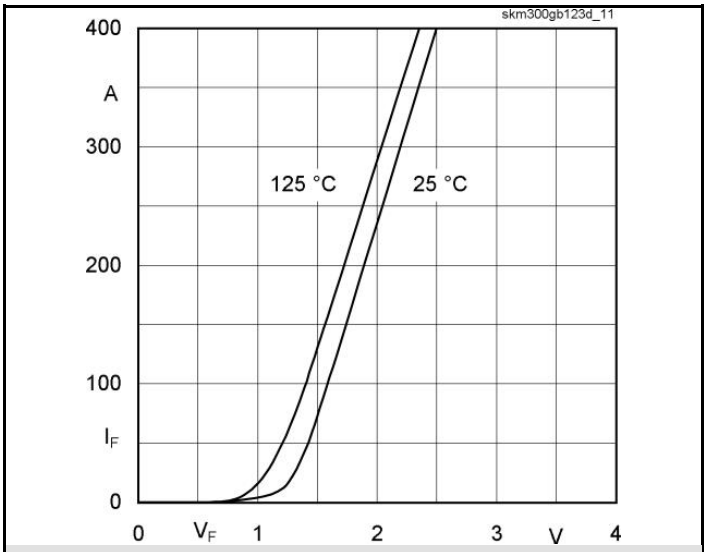



Fig. 10 CAL diode forward characteristic

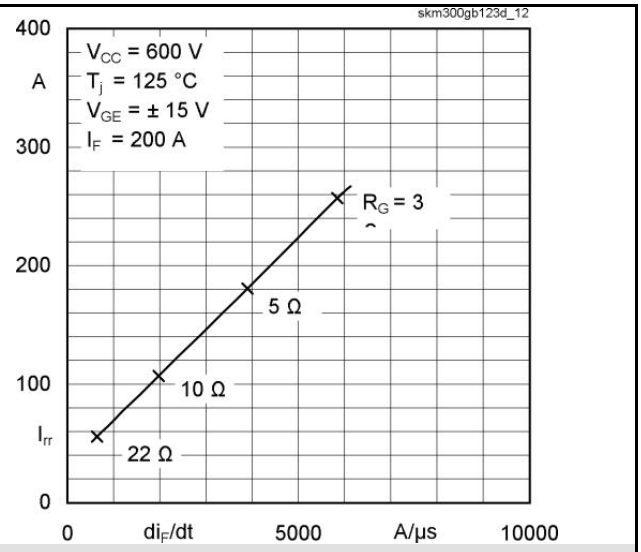



Fig. 11 Typ. CAL diode peak reverse recovery current

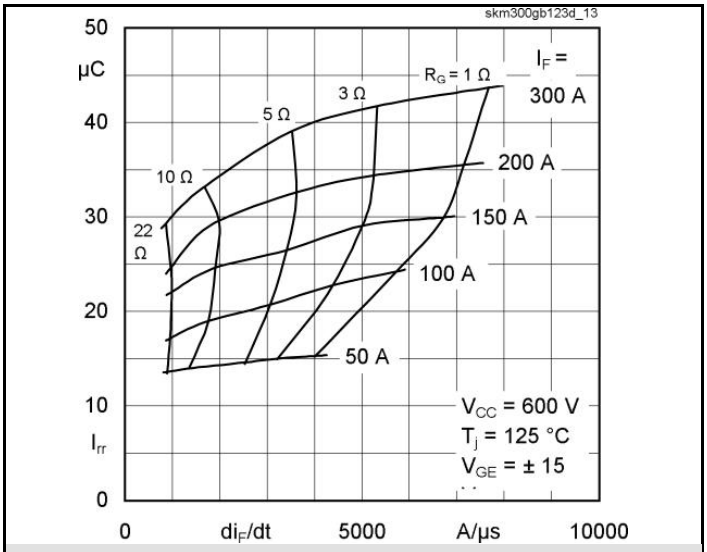
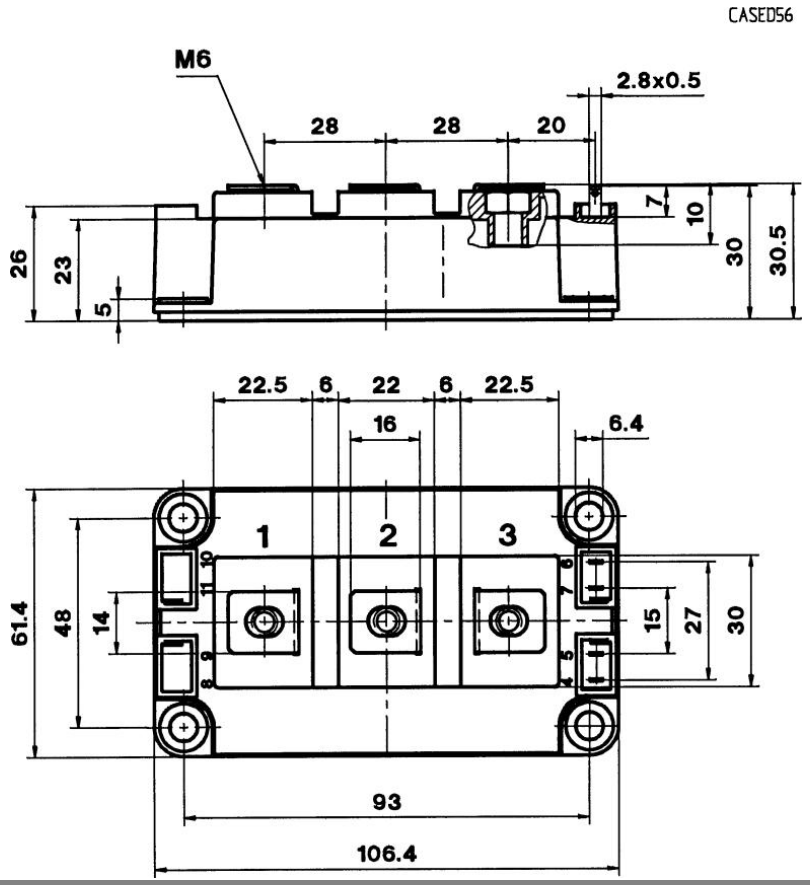


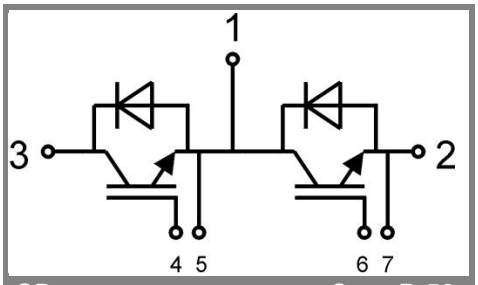

Fig. 12 Typ. CAL diode peak reverse recovery charge

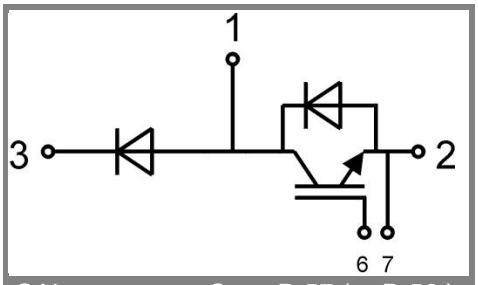
UL Recognized File 63 532



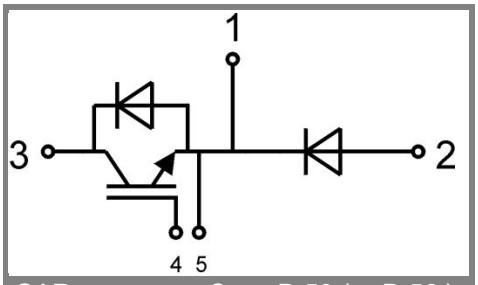

Case D 56




GB Case D 56




GAL Case D 57 (➞ D 56 )




GAR Case D 58 (➞ D 56 )