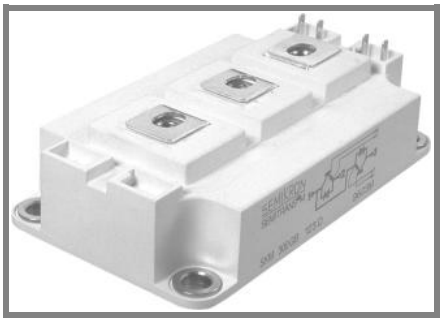
# SKM 300GB063D



**SEMITRANS® 3**

## Superfast IGBT Modules

**SKM 300GB063D**

**SKM 300GAR063D**

**SKM 300GAL063D**

### Features

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- Low tail current with low temperature dependence
- High short circuit capability, self limiting if term. G is clamped to E
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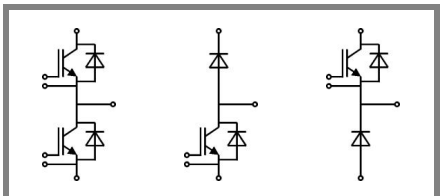
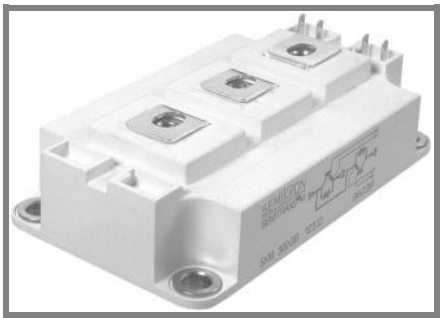


GB GAL GAR

| **Absolute Maximum Ratings** | | | $T_c$ = 25 °C, unless otherwise specified | |
|---|---|---|---|---|
| **Symbol** | **Conditions** | | **Values** | **Units** |
| **IGBT** | | | | |
| $V_{CES}$ | $T_j$ = 25 °C | | 600 | V |
| $I_C$ | $T_j$ = 150 °C | $T_{case}$ = 25 °C | 400 | A |
| | | $T_{case}$ = 70 °C | 300 | A |
| $I_{CRM}$ | $I_{CRM}$=2x$I_{Cnom}$ | | 600 | A |
| $V_{GES}$ | | | ± 20 | V |
| $t_{psc}$ | $V_{CC}$ = 300 V; $V_{GE} \leq$ 20 V; $V_{CES}$ < 600 V | $T_j$ = 125 °C | 10 | µs |
| **Inverse Diode** | | | | |
| $I_F$ | $T_j$ = 150 °C | $T_{case}$ = 25 °C | 250 | A |
| | | $T_{case}$ = 80 °C | 170 | A |
| $I_{FRM}$ | $I_{FRM}$=2x$I_{Fnom}$ | | 600 | A |
| $I_{FSM}$ | $t_p$ = 10 ms; sin. | $T_j$ = 150 °C | 1600 | A |
| **Freewheeling Diode** | | | | |
| $I_F$ | $T_j$ = 150 °C | $T_c$ = 25 °C | 400 | A |
| | | $T_c$ = 80 °C | 270 | A |
| $I_{FRM}$ | $I_{FRM}$=2x$I_{Fnom}$ | | 800 | A |
| $I_{FSM}$ | $t_p$ = 10 ms; sin. | $T_j$ = 150 °C | 2800 | 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** | | | | | | |
| $V_{GE(th)}$ | $V_{GE}$ = $V_{CE}$, $I_C$ = 6 mA | | 4,5 | 5,5 | 6,5 | V |
| $I_{CES}$ | $V_{GE}$ = 0 V, $V_{CE}$ = $V_{CES}$ | $T_j$ = 25 °C | | 0,2 | 0,6 | mA |
| $V_{CE0}$ | | $T_j$ = 25 °C | | 1,05 | | V |
| | | $T_j$ = 125 °C | | 1 | | V |
| $r_{CE}$ | $V_{GE}$ = 15 V | $T_j$ = 25°C | | 3,2 | | mΩ |
| | | $T_j$ = 125°C | | 4,7 | | mΩ |
| $V_{CE(sat)}$ | $I_{Cnom}$ = 300 A, $V_{GE}$ = 15 V | $T_j$ = 25°C$_{chiplev.}$ | | 2,1 | 2,5 | V |
| | | $T_j$ = 125°C$_{chiplev.}$ | | 2,4 | 2,8 | V |
| $C_{ies}$ | $V_{CE}$ = 25, $V_{GE}$ = 0 V | f = 1 MHz | | 17 | | nF |
| $C_{oes}$ | | | | 2 | | nF |
| $C_{res}$ | | | | 1,2 | | nF |
| $Q_G$ | $V_{GE}$ = 0V...+15V | | | 720 | | nC |
| $R_{Gint}$ | $T_j$ = °C | | | 0 | | Ω |
| $t_{d(on)}$ | $R_{Gon}$ = 6 Ω | $V_{CC}$ = 300V | | 160 | | ns |
| $t_r$ | | $I_C$= 300A | | 80 | | ns |
| $E_{on}$ | | $T_j$ = 125 °C | | 14 | | mJ |
| $t_{d(off)}$ | $R_{Goff}$ = 6 Ω | $V_{GE}$ = ± 15V | | 550 | | ns |
| $t_f$ | | | | 50 | | ns |
| $E_{off}$ | | | | 13 | | mJ |
| $R_{th(j-c)}$ | per IGBT | | | | 0,09 | K/W |

# SKM 300GB063D



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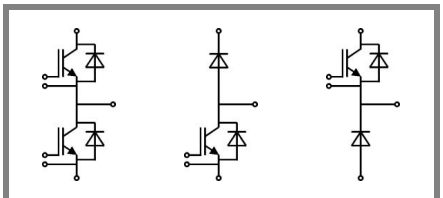


GB GAL GAR

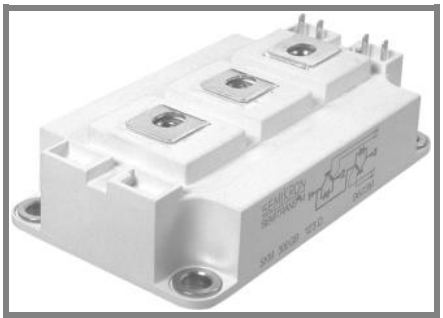
**Characteristics**

| Symbol | Conditions | | min. | typ. | max. | Units |
|---|---|---|---|---|---|---|
| **Inverse Diode** | | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom}$ = 300 A; $V_{GE}$ = 0 V | $T_j$ = 25 °C$_{chiplev.}$ | | 1,65 | 2 | V |
| | | $T_j$ = 125 °C$_{chiplev.}$ | | 1,65 | 2 | V |
| $V_{F0}$ | | $T_j$ = 125 °C | | | 0,9 | V |
| $r_F$ | | $T_j$ = 125 °C | | 3 | 3,7 | mΩ |
| $I_{RRM}$ | $I_F$ = 300 A | $T_j$ = 125 °C | | 120 | | A |
| $Q_{rr}$ | | | | 18 | | µC |
| $E_{rr}$ | $V_{GE}$ = -15 V; $V_{CC}$ = 300 V | | | | | mJ |
| $R_{th(j-c)D}$ | per diode | | | | 0,25 | K/W |
| **Freewheeling Diode** | | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom}$ = 400 A; $V_{GE}$ = 0 V | $T_j$ = 25 °C$_{chiplev.}$ | | 1,65 | 2 | V |
| | | $T_j$ = 125 °C$_{chiplev.}$ | | 1,65 | 2 | V |
| $V_{F0}$ | | $T_j$ = 125 °C | | | 0,9 | V |
| $r_F$ | | $T_j$ = 125 °C | | | 3 | V |
| $I_{RRM}$ | $I_F$ = 300 A | $T_j$ = 125 °C | | 130 | | A |
| $Q_{rr}$ | | | | 23 | | µC |
| $E_{rr}$ | $V_{GE}$ = -15 V; $V_{CC}$ = 300 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 300GB063D



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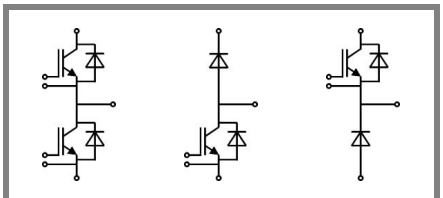

**GB** **GAL** **GAR**

| $Z_{th}$ Symbol | Conditions | Values | Units |
|---|---|---|---|
| **$Z_{th(j-c)I}$** | | | |
| $R_i$ | i = 1 | 65 | mk/W |
| $R_i$ | i = 2 | 19 | mk/W |
| $R_i$ | i = 3 | 4,7 | mk/W |
| $R_i$ | i = 4 | 1,3 | mk/W |
| $tau_i$ | i = 1 | 0,0518 | s |
| $tau_i$ | i = 2 | 0,0241 | s |
| $tau_i$ | i = 3 | 0,0021 | s |
| $tau_i$ | i = 4 | 0,0001 | s |
| **$Z_{th(j-c)D}$** | | | |
| $R_i$ | i = 1 | 140 | mk/W |
| $R_i$ | i = 2 | 85 | mk/W |
| $R_i$ | i = 3 | 20,55 | mk/W |
| $R_i$ | i = 4 | 4,45 | mk/W |
| $tau_i$ | i = 1 | 0,0613 | s |
| $tau_i$ | i = 2 | 0,0041 | s |
| $tau_i$ | i = 3 | 0,0045 | s |
| $tau_i$ | i = 4 | 0,0003 | s |

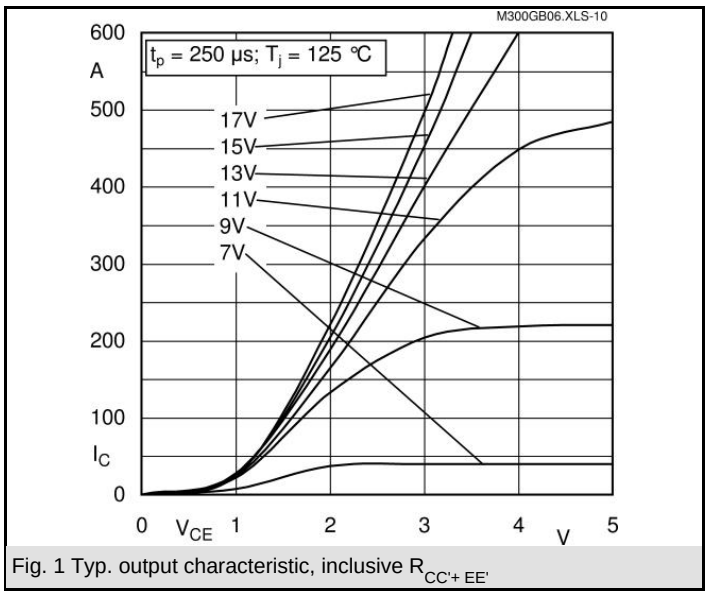

Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

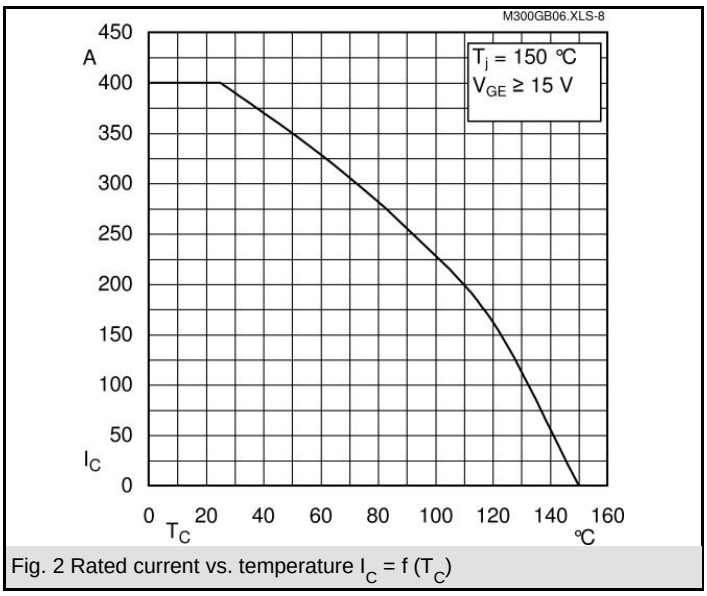

Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

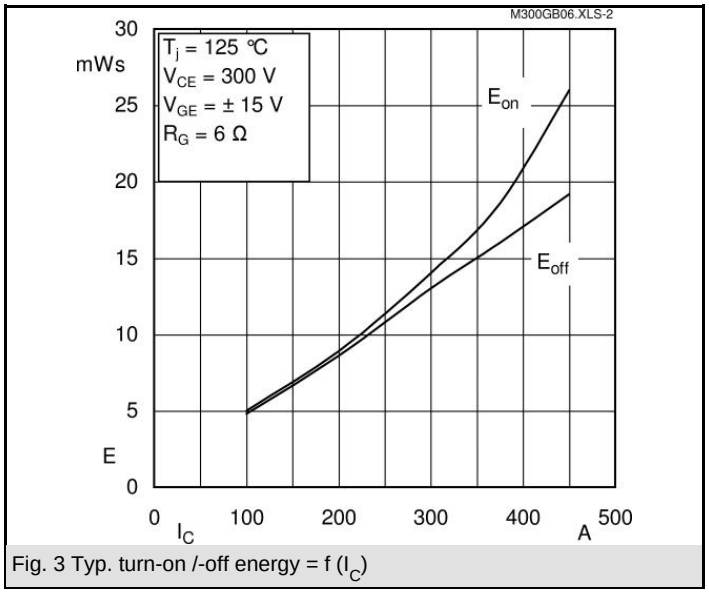

Fig. 3 Typ. turn-on /-off energy = f ($I_C$)

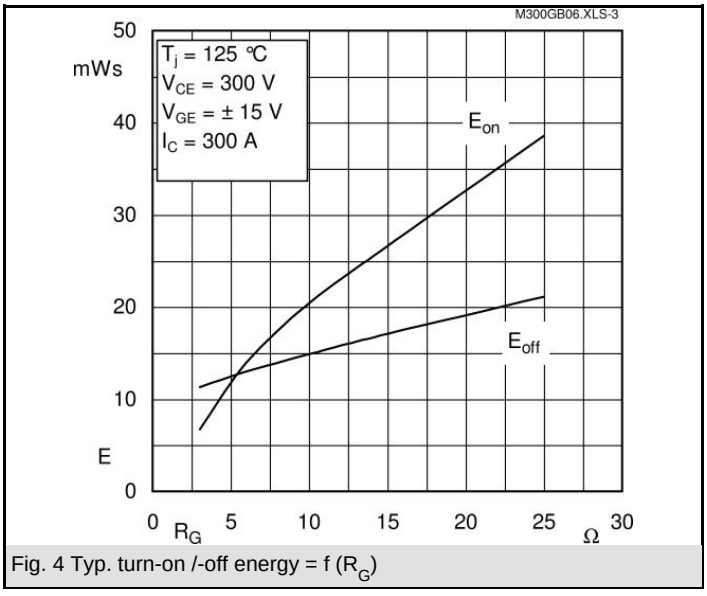

Fig. 4 Typ. turn-on /-off energy = f ($R_G$)

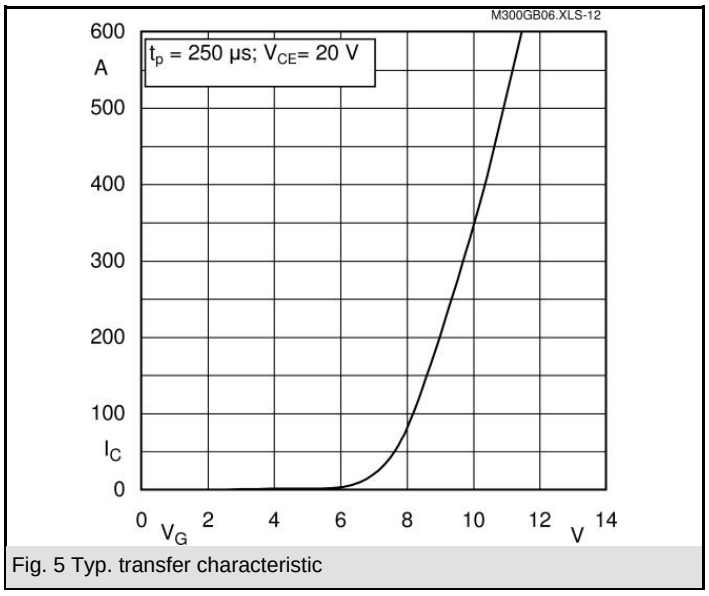

Fig. 5 Typ. transfer characteristic

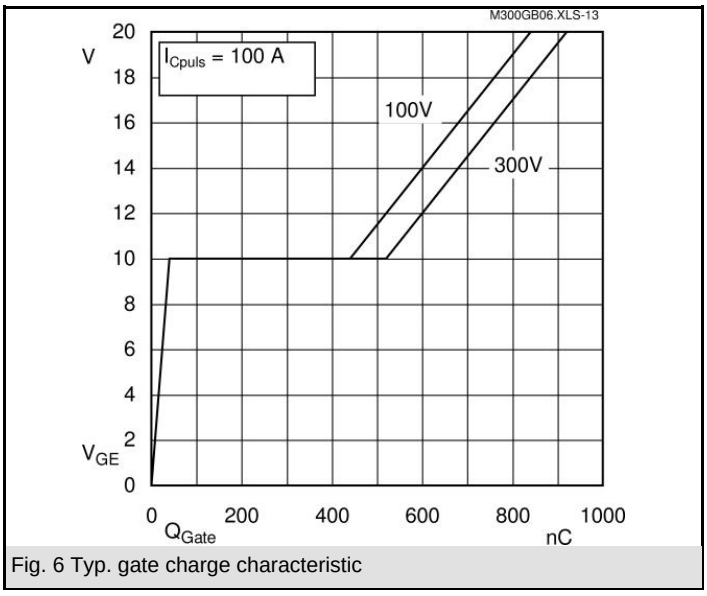

Fig. 6 Typ. gate charge characteristic

 

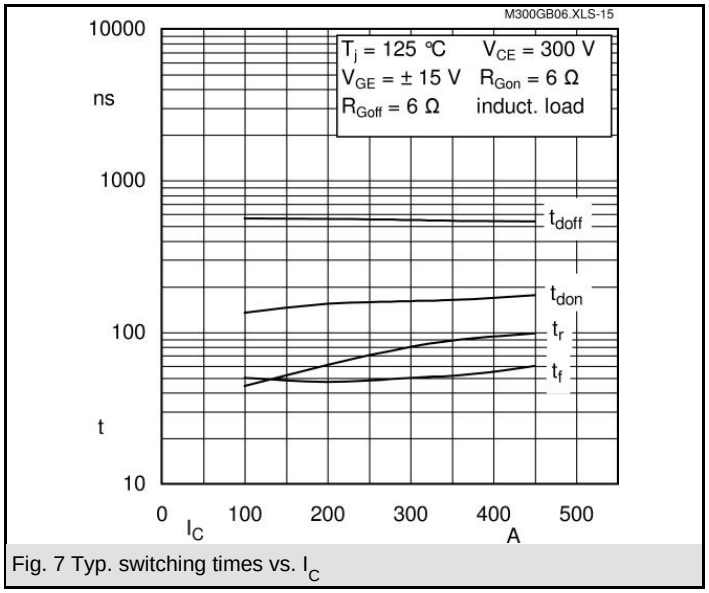


Fig. 7 Typ. switching times vs. $I_C$

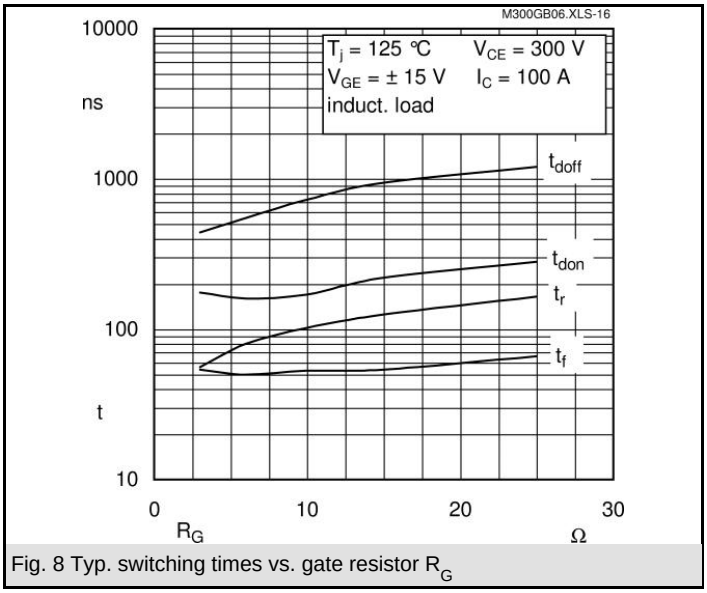


Fig. 8 Typ. switching times vs. gate resistor $R_G$

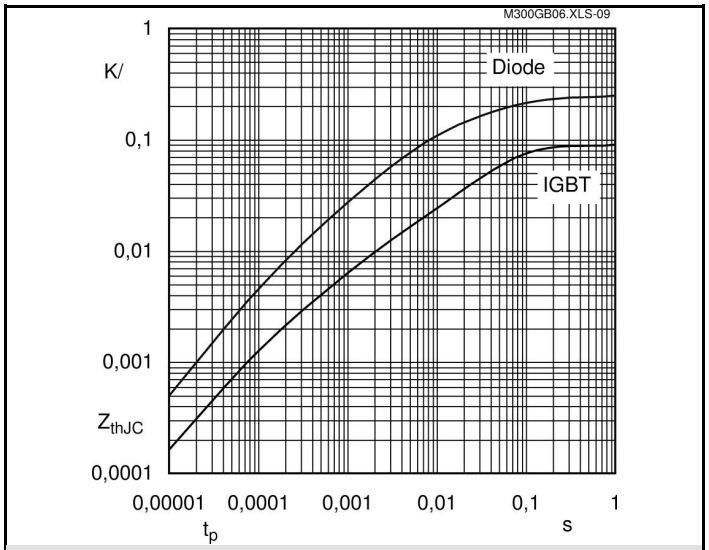


Fig. 9 Transient thermal impedance of IGBT and Diode

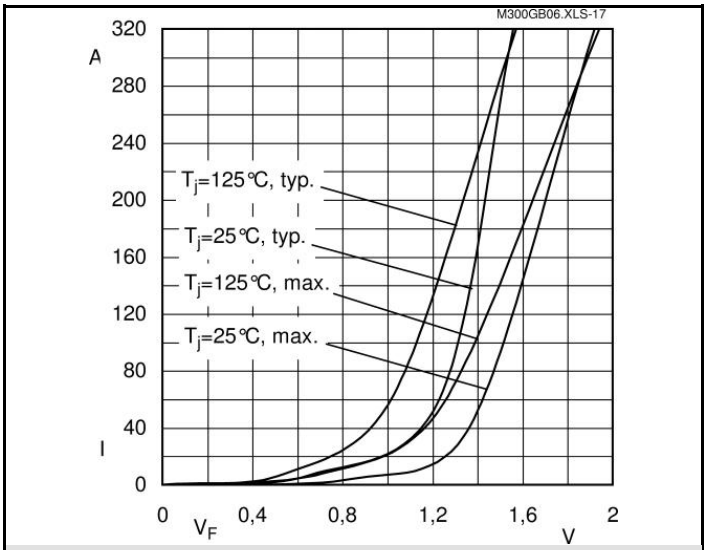


Fig. 10 CAL diode forward characteristic, inclusive $R_{CC'+EE'}$

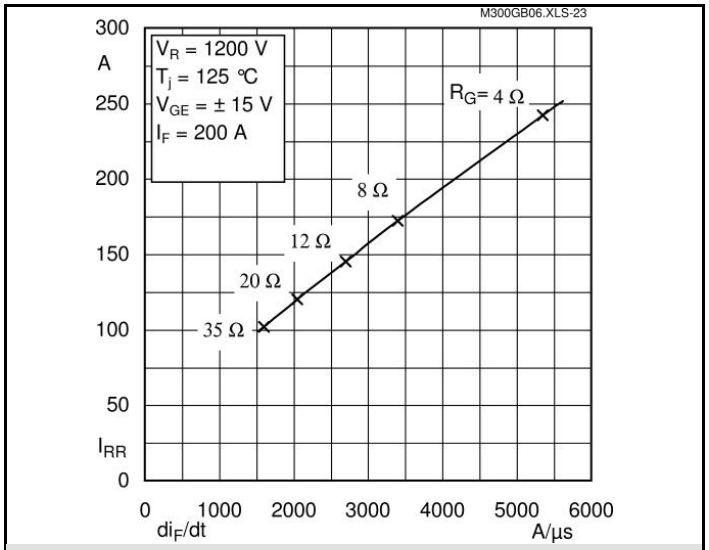


Fig. 11 Typ. CAL diode peak reverse recovery current

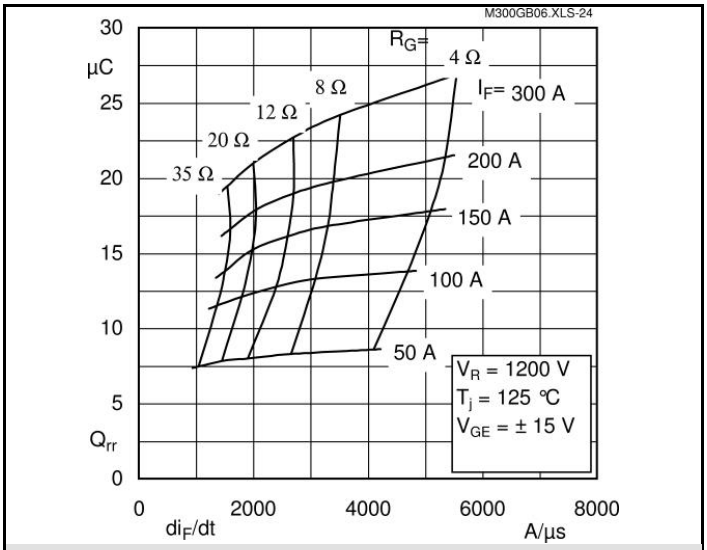


Fig. 12 Typ. CAL diode recovered charge

 

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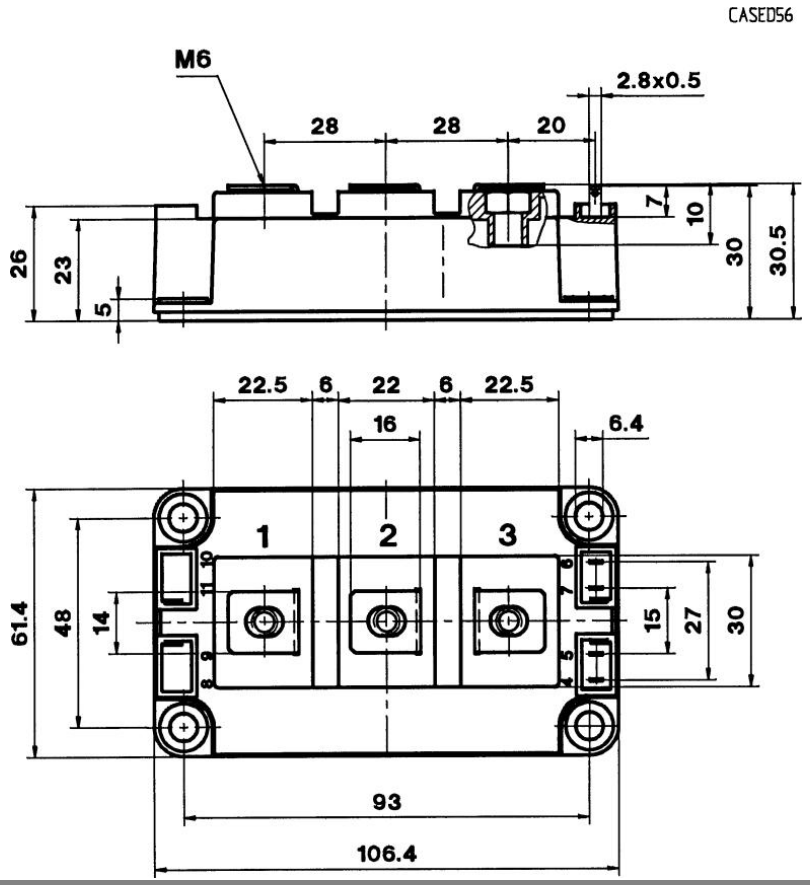
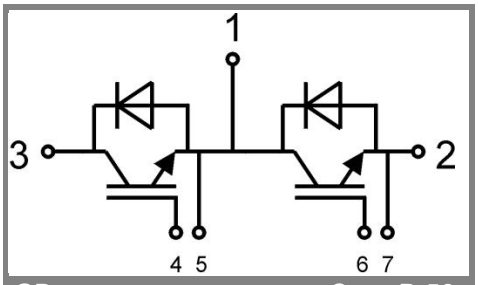
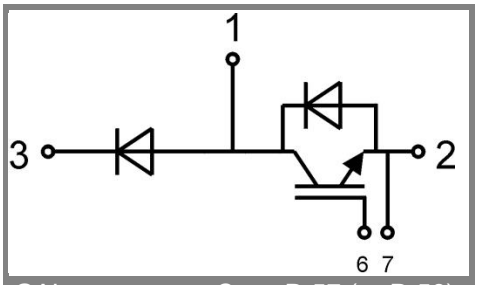
UL Recognized File no. E 63 532



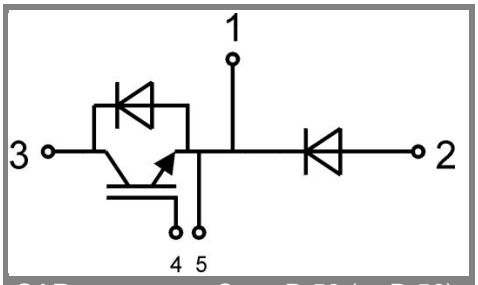

Case D 56




GB Case D 56




GAL Case D 57 (➞ D 56)




GAR Case D 58 (➞ D 56)