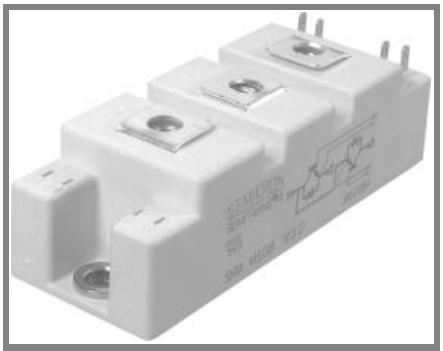
# SKM 100GB128D



**SEMITRANS® 2**

## SPT IGBT Module

**SKM 100GB128D**

### Features

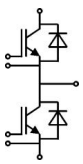
- SPT = Soft-Punch-Through technology
- $V_{CEsat}$ with positive temperature coefficient
- High short circuit capability, self limiting to 6 x $I_c$

### Typical Applications

- AC inverter drives
- UPS
- Electronic welders at $f_{sw}$ up to 20 kHz

| 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 | $T_c$ = 25 °C | 145 | A |
| | | $T_c$ = 80 °C | 105 | A |
| $I_{CRM}$ | $I_{CRM}$=2x$I_{Cnom}$ | | 150 | 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 | 95 | A |
| | | $T_{case}$ = 80 °C | 65 | A |
| $I_{FRM}$ | $I_{FRM}$=2x$I_{Fnom}$ | | 150 | A |
| $I_{FSM}$ | $t_p$ = 10 ms; sin. | $T_j$ = 150 °C | 720 | A |
| **Module** | | | | |
| $I_{t(RMS)}$ | | | 200 | A |
| $T_{vj}$ | | | - 40... + 150 | °C |
| $T_{stg}$ | | | - 40... + 125 | °C |
| $V_{isol}$ | AC, 1 min. | | 4000 | V |

| Characteristics | | | $T_c$ = 25 °C, unless otherwise specified | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Conditions** | | **min.** | **typ.** | **max.** | **Units** |
| **IGBT** | | | | | | |
| $V_{GE(th)}$ | $V_{GE}$ = $V_{CE}$, $I_C$ = 3 mA | | 4,5 | 5,5 | 6,45 | 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 | 1,15 | V |
| | | $T_j$ = 125 °C | | 0,9 | 1,05 | V |
| $r_{CE}$ | $V_{GE}$ = 15 V | $T_j$ = 25°C | | 13 | 16 | mΩ |
| | | $T_j$ = 125°C | | 16 | 20 | mΩ |
| $V_{CE(sat)}$ | $I_{Cnom}$ = 75 A, $V_{GE}$ = 15 V | $T_j$ = 25°C$_{chiplev.}$ | | 1,9 | 2,35 | V |
| | | $T_j$ = 125°C$_{chiplev.}$ | | 2,1 | 2,55 | V |
| $C_{ies}$ | $V_{CE}$ = 25, $V_{GE}$ = 0 V | f = 1 MHz | | 6,2 | | nF |
| $C_{oes}$ | | | | 0,74 | | nF |
| $C_{res}$ | | | | 0,71 | | nF |
| $Q_G$ | $V_{GE}$ = -8V - +20V | | | 860 | | nC |
| $R_{Gint}$ | $T_j$ = 25 °C | | | 5 | | Ω |
| $t_{d(on)}$ | $R_{Gon}$ = 4,7 Ω | $V_{CC}$ = 600V | | 175 | | ns |
| $t_r$ | | $I_{Cnom}$= 75A | | 38 | | ns |
| $E_{on}$ | | $T_j$ = 125 °C | | 9 | | mJ |
| $t_{d(off)}$ | $R_{Goff}$ = 4,7 Ω | $V_{GE}$ = ±15V | | 370 | | ns |
| $t_f$ | | | | 65 | | ns |
| $E_{off}$ | | | | 7,5 | | mJ |
| $R_{th(j-c)}$ | per IGBT | | | | 0,21 | K/W |



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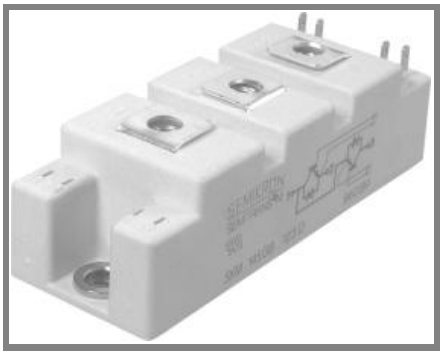

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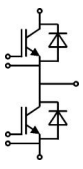

**GB**

| Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Conditions** | | **min.** | **typ.** | **max.** | **Units** |
| **Inverse Diode** | | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom}$ = 75 A; $V_{GE}$ = 0 V | $T_j$ = 25 °$C_{chiplev.}$ | | 2 | 2,5 | V |
| | | $T_j$ = 125 °$C_{chiplev.}$ | | 1,8 | | V |
| $V_{F0}$ | | $T_j$ = 25 °C | | 1,1 | 1,2 | V |
| $r_F$ | | $T_j$ = 25 °C | | 12 | 17,3 | mΩ |
| $I_{RRM}$ | $I_{Fnom}$ = 75 A | $T_j$ = 125 °C | | 88 | | A |
| $Q_{rr}$ | di/dt = 2800 A/µs | | | 13 | | µC |
| $E_{rr}$ | $V_{GE}$ = -15 V; $V_{CC}$ = 600 V | | | 3,9 | | 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 | | | | | 160 | g |

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

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability.

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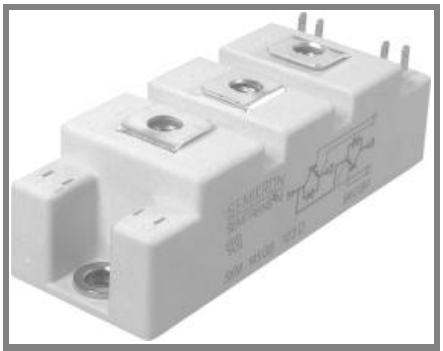

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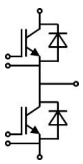
| $Z_{th}$ Symbol | Conditions | Values | Units |
|---|---|---|---|
| **$Z_{th(j-c)I}$** | | | |
| $R_i$ | i = 1 | 114 | mk/W |
| $R_i$ | i = 2 | 71 | mk/W |
| $R_i$ | i = 3 | 22 | mk/W |
| $R_i$ | i = 4 | 3 | mk/W |
| $tau_i$ | i = 1 | 0,054 | s |
| $tau_i$ | i = 2 | 0,0115 | s |
| $tau_i$ | i = 3 | 0,0012 | s |
| $tau_i$ | i = 4 | 0,001 | s |
| **$Z_{th(j-c)D}$** | | | |
| $R_i$ | i = 1 | 300 | mk/W |
| $R_i$ | i = 2 | 160 | mk/W |
| $R_i$ | i = 3 | 35,5 | mk/W |
| $R_i$ | i = 4 | 4,5 | mk/W |
| $tau_i$ | i = 1 | 0,054 | s |
| $tau_i$ | i = 2 | 0,0071 | s |
| $tau_i$ | i = 3 | 0,0017 | s |
| $tau_i$ | i = 4 | 0,005 | s |



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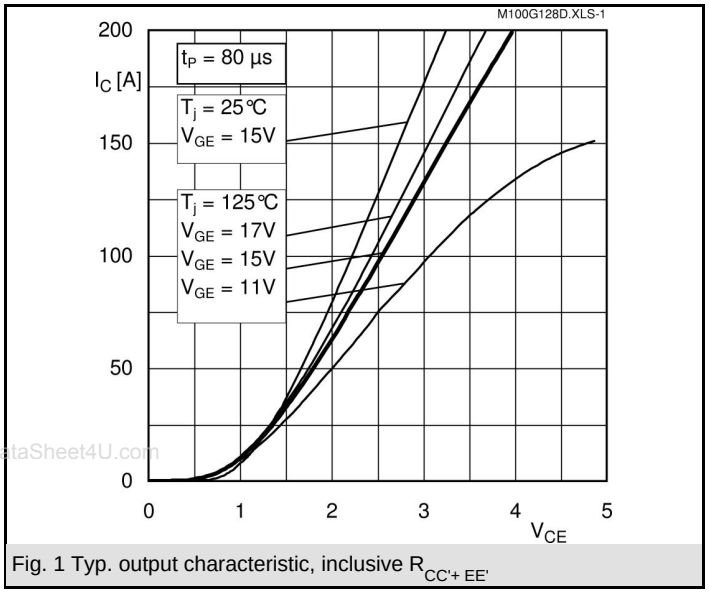


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

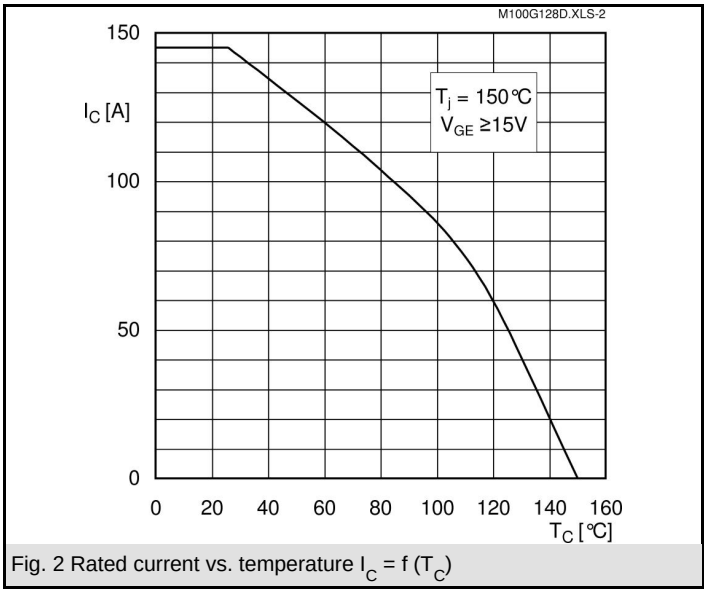


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

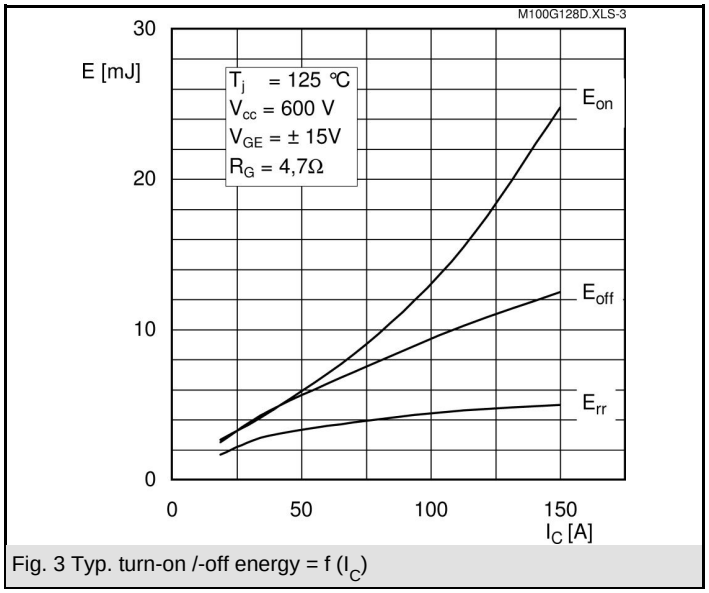


Fig. 3 Typ. turn-on /-off energy = f ($I_C$)

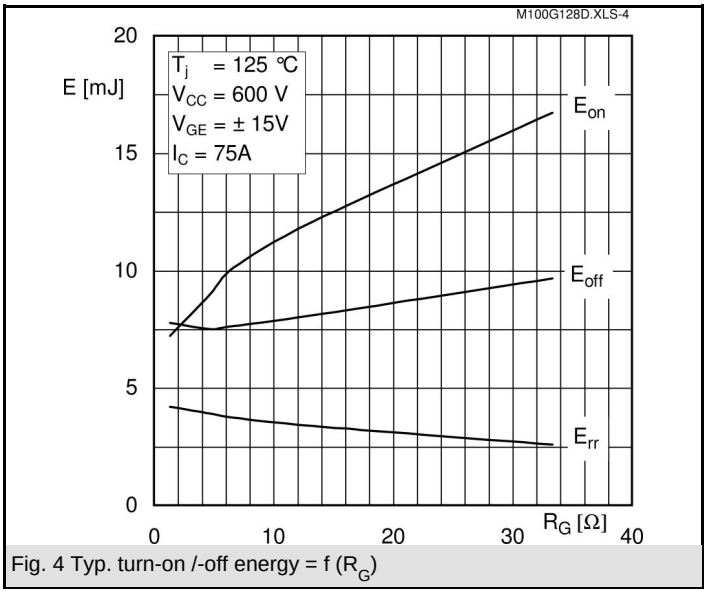


Fig. 4 Typ. turn-on /-off energy = f ($R_G$)

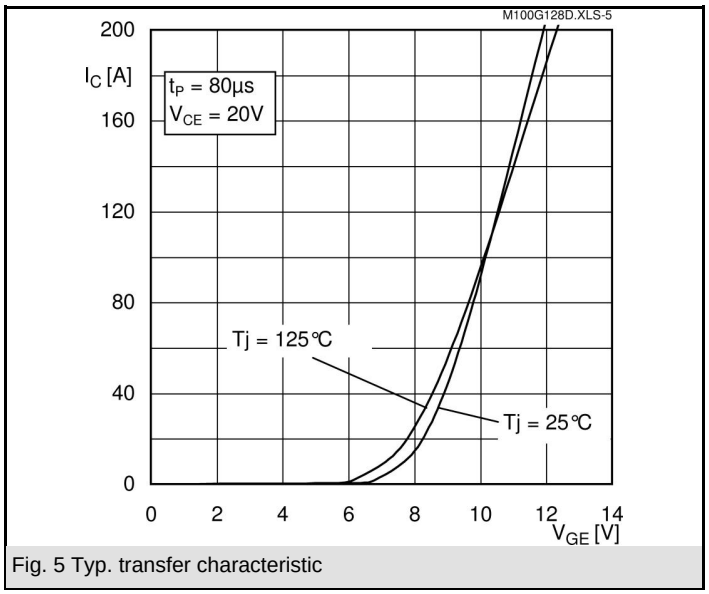


Fig. 5 Typ. transfer characteristic

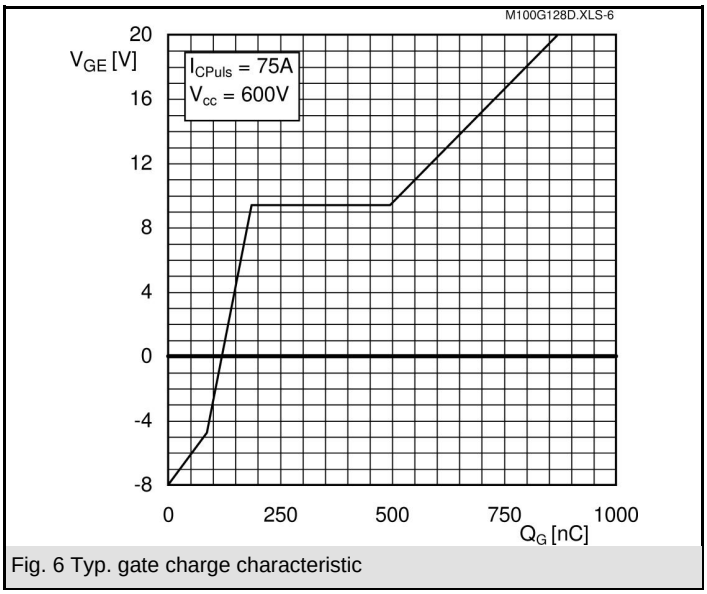


Fig. 6 Typ. gate charge characteristic

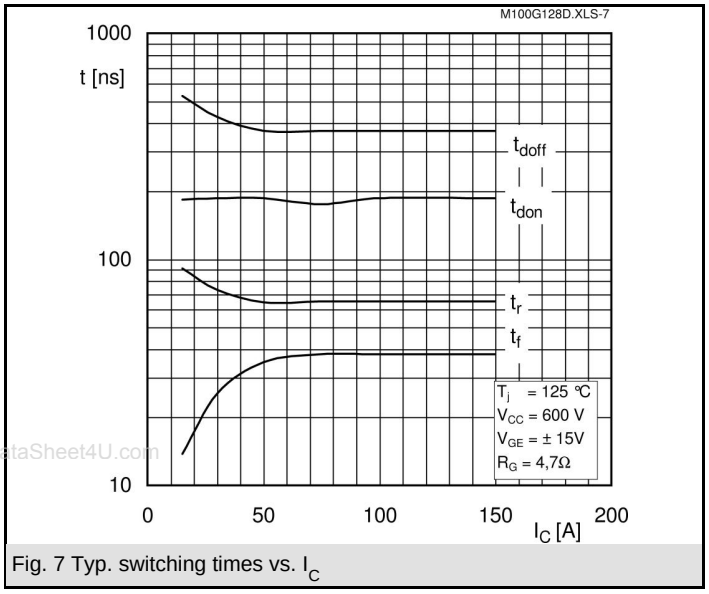


Fig. 7 Typ. switching times vs. $I_C$

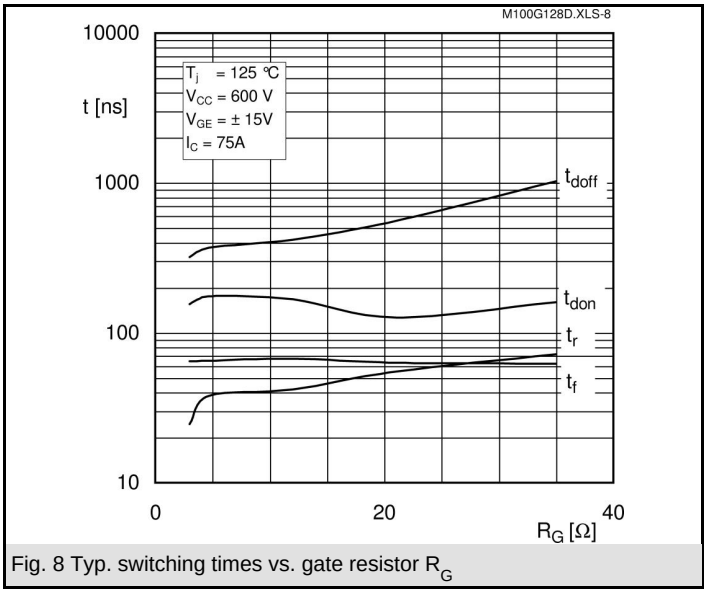


Fig. 8 Typ. switching times vs. gate resistor $R_G$

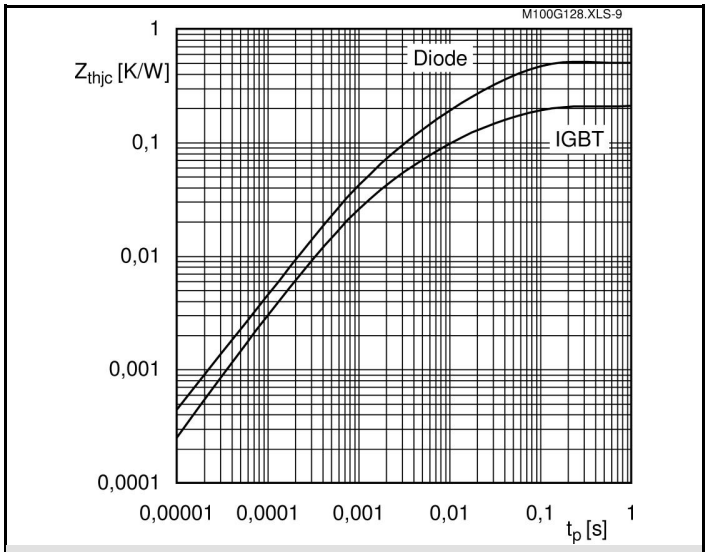


Fig. 9 Transient thermal impedance

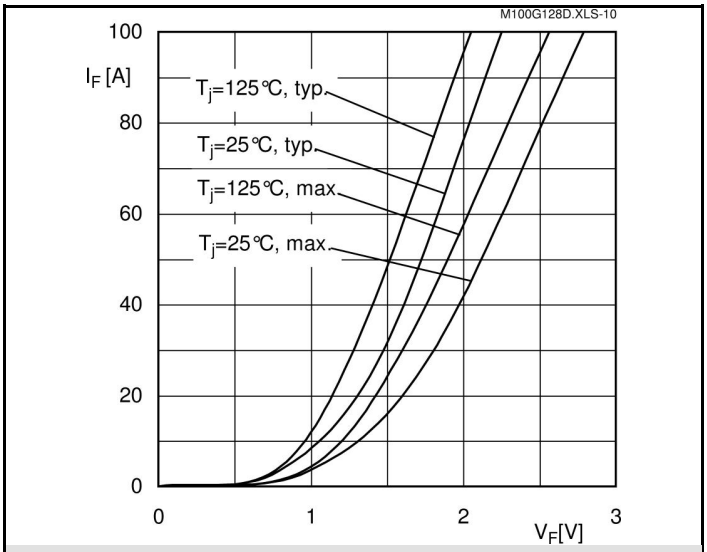


Fig. 10 CAL diode forward characteristic

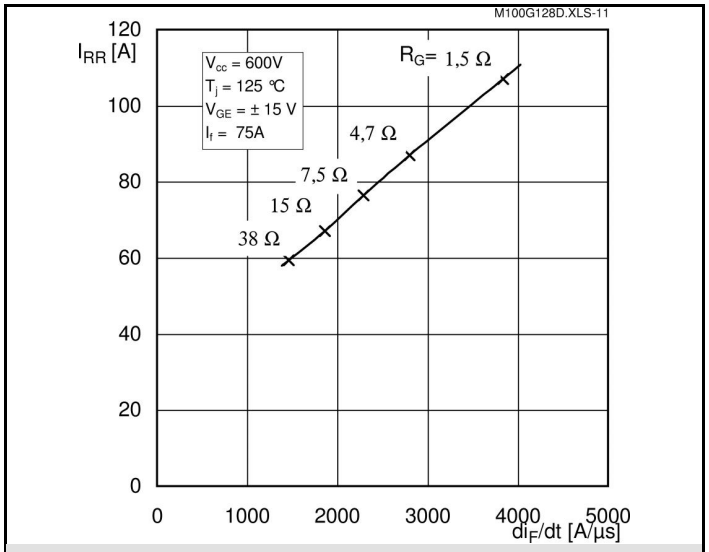


Fig. 11 Typ. CAL diode peak reverse recovery current

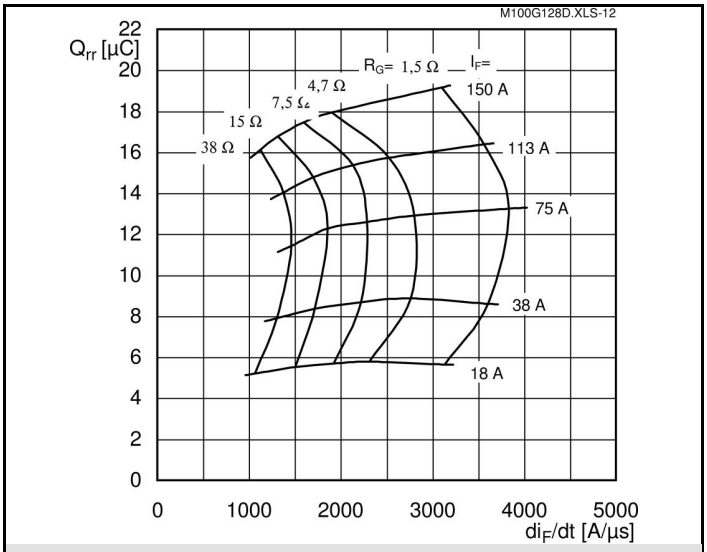


Fig. 12 Typ. CAL diode peak reverse recovery charge

UL Regognized File no. E 63 532

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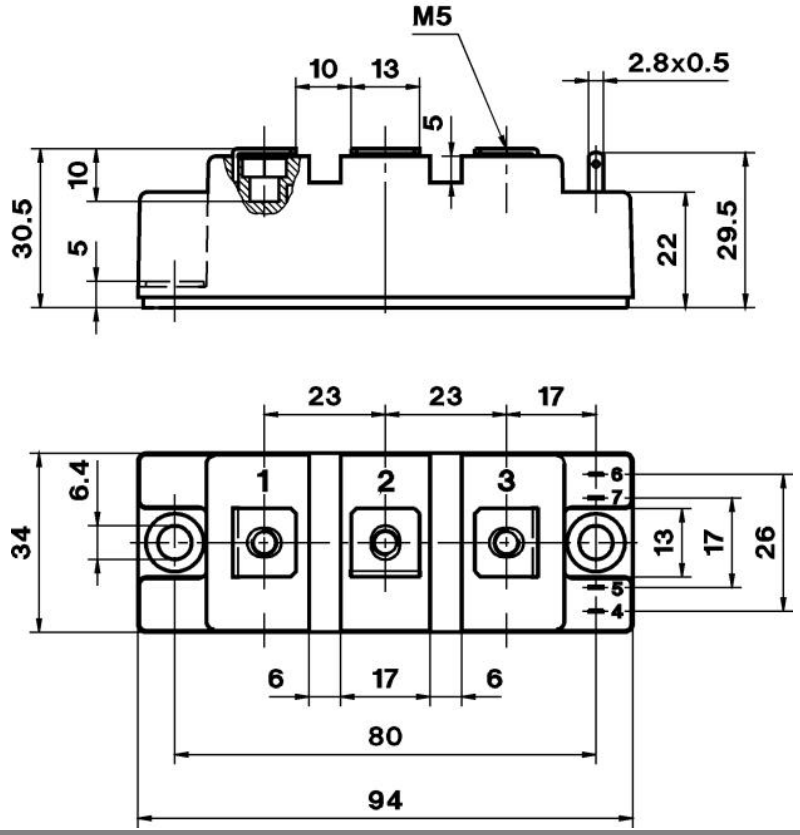
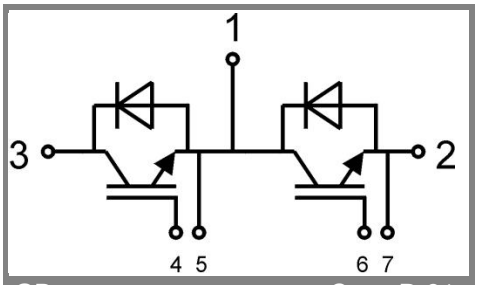



Case D 61




GB Case D 61