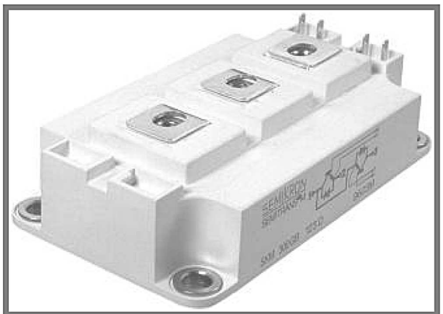
# SKM 300GB125D



SEMITRANS® 3

## Ultra Fast IGBT Module

**SKM 300GB125D**

### Features

- NPT - Non punch-through IGBT
- Low inductance case
- Short tail current with low temperature dependence
- High short circuit capability, self limiting
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DCB Direct Copper Bonding Technology
- Large clearance (10 mm) and creepage distances (20 mm)

### Typical Applications*

- Switched mode power supplies at $f_{sw}$ > 20 kHz
- Resonant inverters up to 100 kHz
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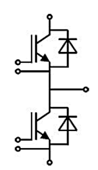
- Electronic welders at $f_{sw}$ > 20 kHz



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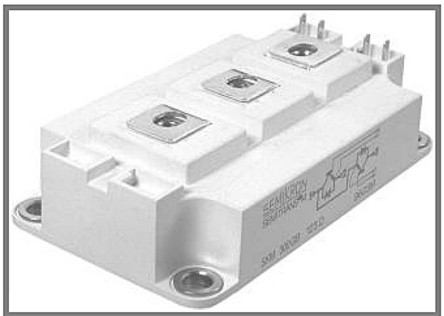
| Absolute Maximum Ratings | | $T_c$ = 25 °C, unless otherwise specified | | |
|---|---|---|---|---|
| **Symbol** | **Conditions** | | **Values** | **Units** |
| **IGBT** | | | | |
| $V_{CES}$ | $T_j$ = 25 °C | | 1200 | V |
| $I_C$ | $T_j$ = 150 °C | $T_{case}$ = 25 °C | 300 | A |
| | | $T_{case}$ = 80 °C | 210 | 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 | 1800 | A |
| **Module** | | | | |
| $I_{t(RMS)}$ | | | 500 | 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** | | | | | | |
| $V_{GE(th)}$ | $V_{GE}$ = $V_{CE}$, $I_C$ = 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 | | 1,5 | 1,75 | V |
| | | $T_j$ = 125 °C | | 1,7 | | V |
| $r_{CE}$ | $V_{GE}$ = 15 V | $T_j$ = 25°C | | 9 | 10,5 | mΩ |
| | | $T_j$ = 125°C | | 11,5 | | mΩ |
| $V_{CE(sat)}$ | $I_{Cnom}$ = 200 A, $V_{GE}$ = 15 V | $T_j$ = °$C_{chiplev.}$ | | 3,3 | 3,85 | V |
| $C_{ies}$ | | | | 18 | 24 | nF |
| $C_{oes}$ | $V_{CE}$ = 25, $V_{GE}$ = 0 V | f = 1 MHz | | 2,5 | 3,2 | nF |
| $C_{res}$ | | | | 1 | 1,3 | nF |
| $Q_G$ | $V_{GE}$ = 0V - +20V | | | 2000 | | nC |
| $R_{Gint}$ | $T_j$ = °C | | | 2,5 | | Ω |
| $t_{d(on)}$ | | | | 130 | | ns |
| $t_r$ | $R_{Gon}$ = 3 Ω | $V_{CC}$ = 600V | | 40 | | ns |
| $E_{on}$ | | $I_C$= 200A | | 16 | | mJ |
| $t_{d(off)}$ | $R_{Goff}$ = 3 Ω | $T_j$ = 125 °C | | 460 | | ns |
| $t_f$ | | $V_{GE}$ = ± 15V | | 30 | | ns |
| $E_{off}$ | | | | | | mJ |
| $R_{th(j-c)}$ | per IGBT | | | | 0,075 | K/W |



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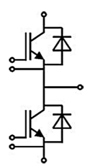

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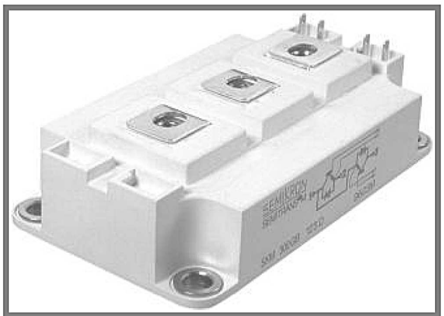
| Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Conditions** | | **min.** | **typ.** | **max.** | **Units** |
| **Inverse Diode** | | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom}$ = 200 A; $V_{GE}$ = 0 V | $T_j$ = 25 °$C_{chiplev.}$ | | 2 | 2,5 | V |
| | | $T_j$ = 125 °$C_{chiplev.}$ | | 1,8 | | 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 | | 340 | | A |
| $Q_{rr}$ | di/dt = 8000 A/µs | | | 46 | | µC |
| $E_{rr}$ | $V_{GE}$ = 0 V; $V_{CC}$ = 600 V | | | | | mJ |
| $R_{th(j-c)D}$ | per diode | | | | 0,18 | 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 300GB125D



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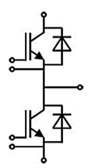

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| $Z_{th}$ Symbol | Conditions | Values | Units |
|---|---|---|---|
| **$Z_{th(j-c)I}$** | | | |
| $R_i$ | i = 1 | 53 | mK/W |
| $R_i$ | i = 2 | 18,5 | mK/W |
| $R_i$ | i = 3 | 3,1 | mK/W |
| $R_i$ | i = 4 | 0,4 | mK/W |
| $tau_i$ | i = 1 | 0,04 | 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 | 115 | mK/W |
| $R_i$ | i = 2 | 52 | mK/W |
| $R_i$ | i = 3 | 11 | mK/W |
| $R_i$ | i = 4 | 2 | 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 |

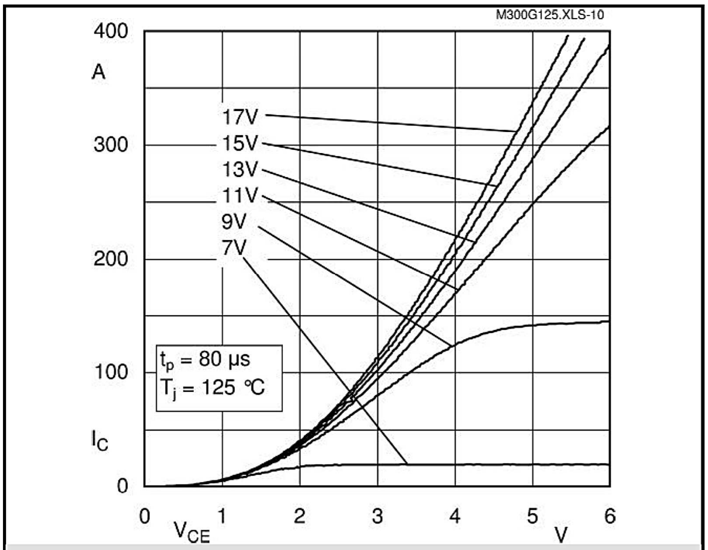


Fig. 1 Typ. output characteristic, $t_p$ = 80 µs; 125 °C

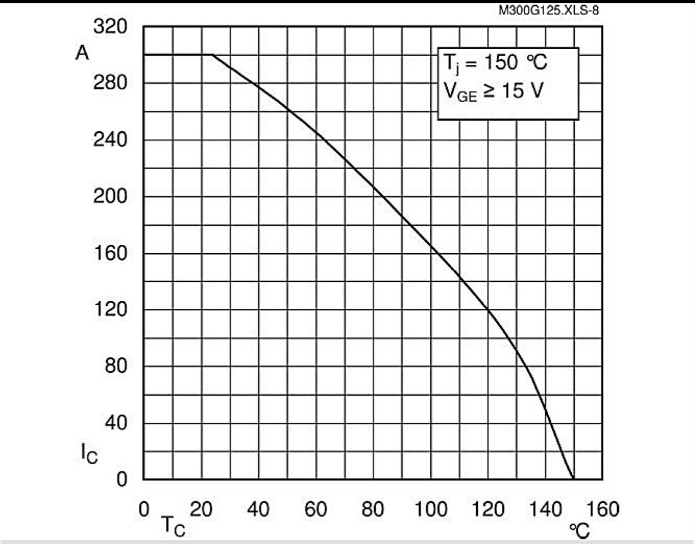


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

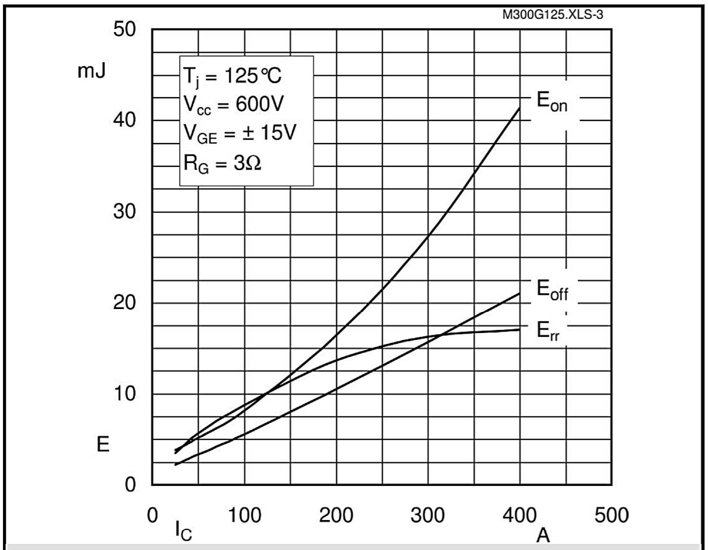


Fig. 3 Typ. turn-on /-off energy = f ($I_C$)

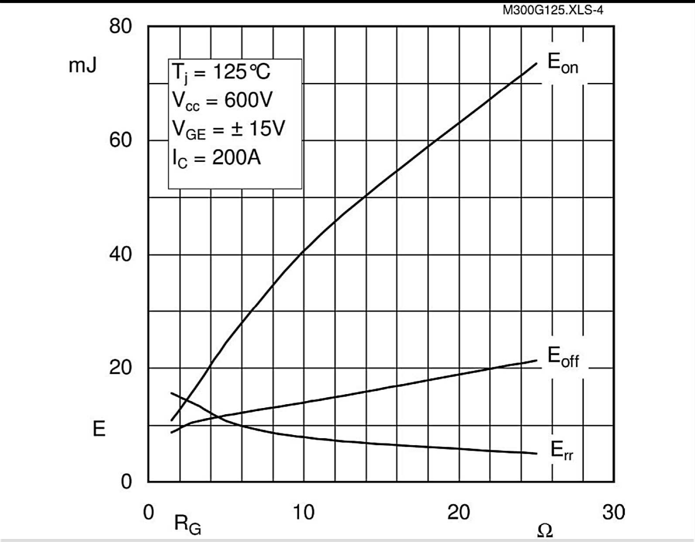


Fig. 4 Typ. turn-on /-off energy = f ($R_G$)

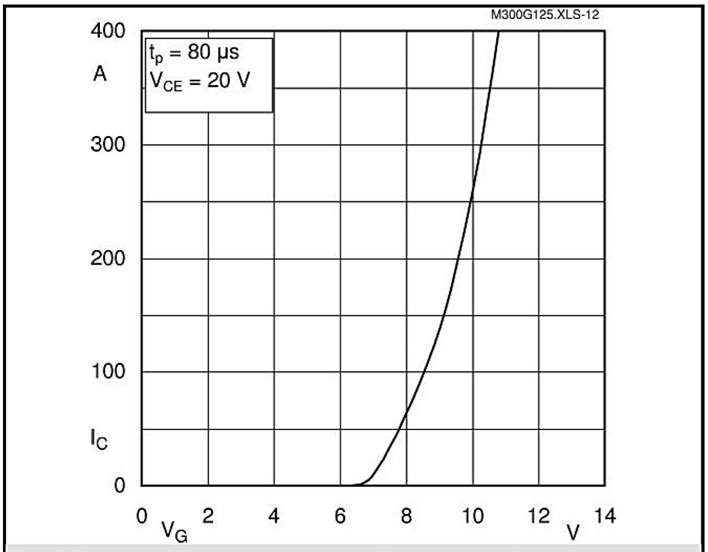


Fig. 5 Typ. transfer characteristic, $t_p$ = 80 µs; $V_{CE}$ = 20 V

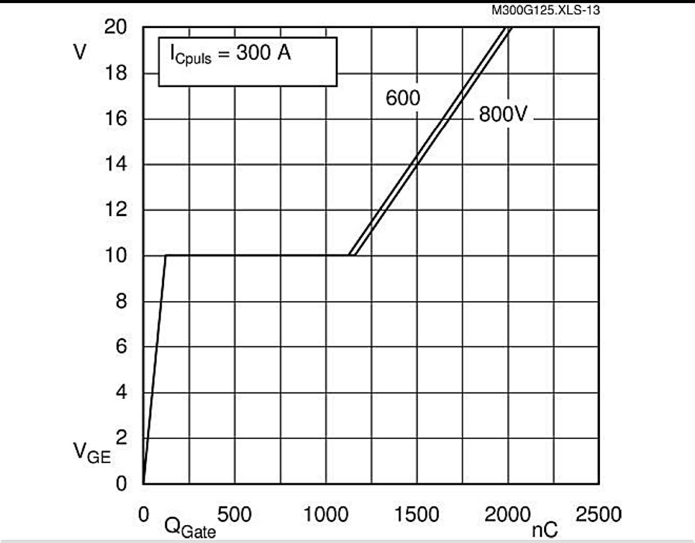


Fig. 6 Typ. gate charge characteristic

 

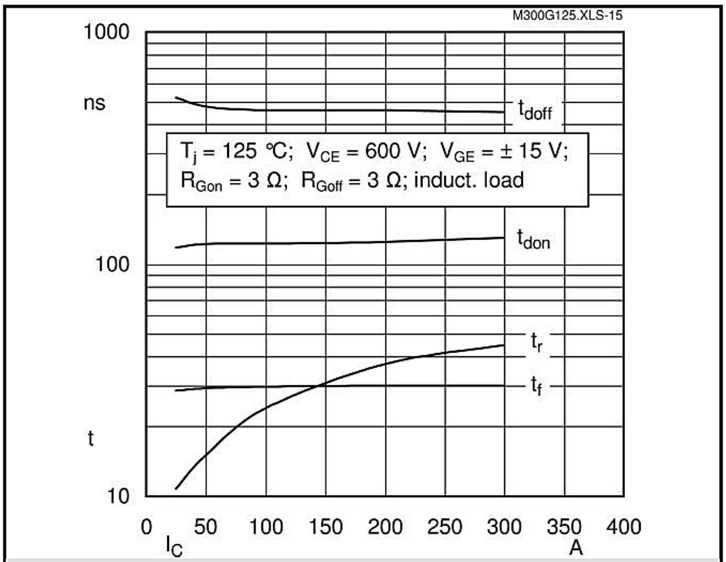


Fig. 7 Typ. switching times vs. $I_C$

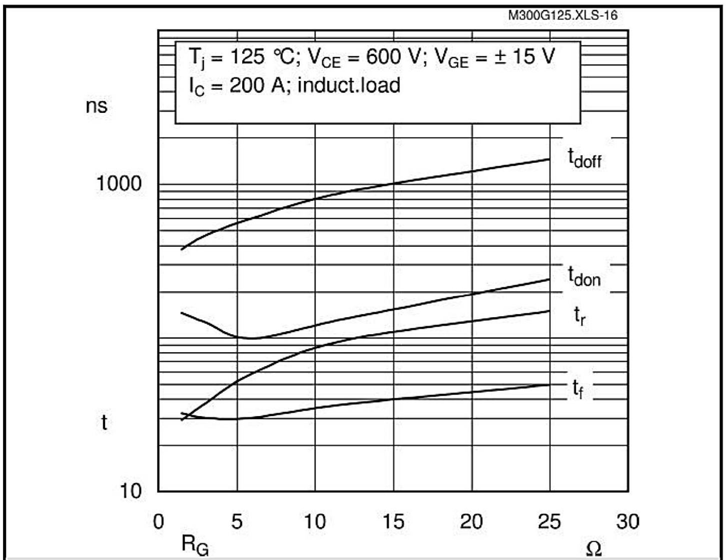


Fig. 8 Typ. switching times vs. gate resistor $R_G$

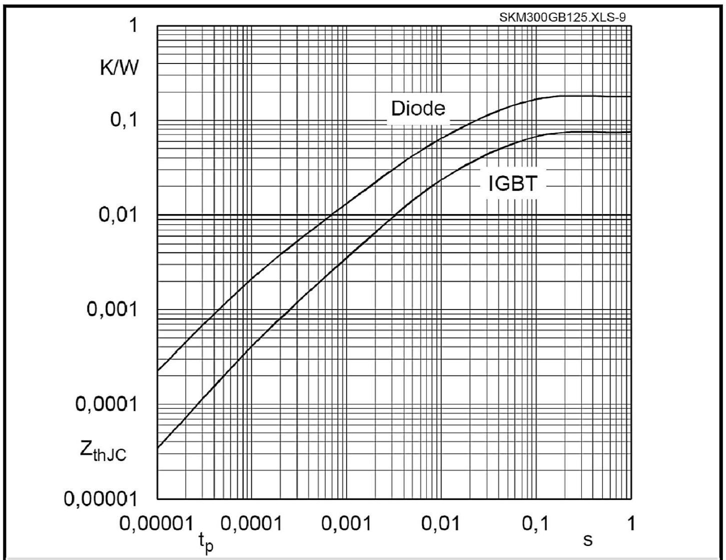


Fig. 9 Transient thermal impedance

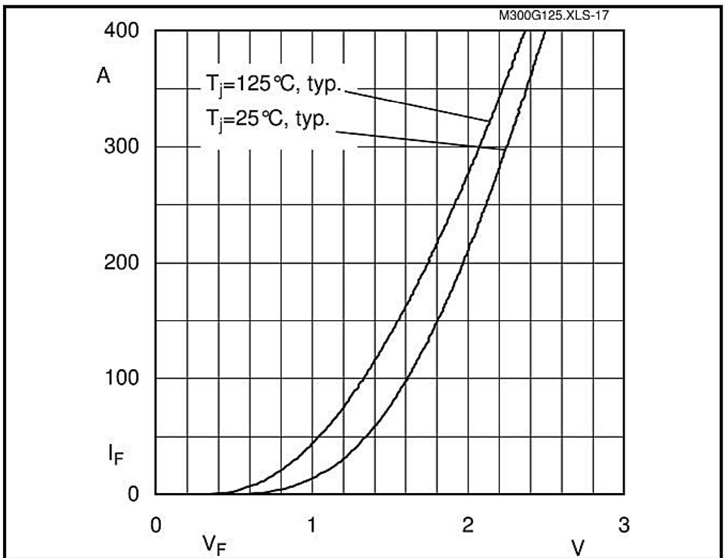


Fig. 10 CAL diode forward characteristic

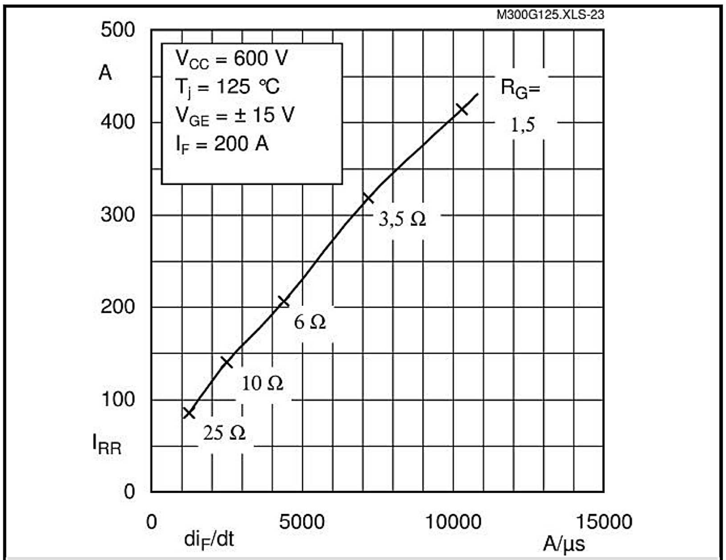


Fig. 11 Typ. CAL diode peak reverse recovery current

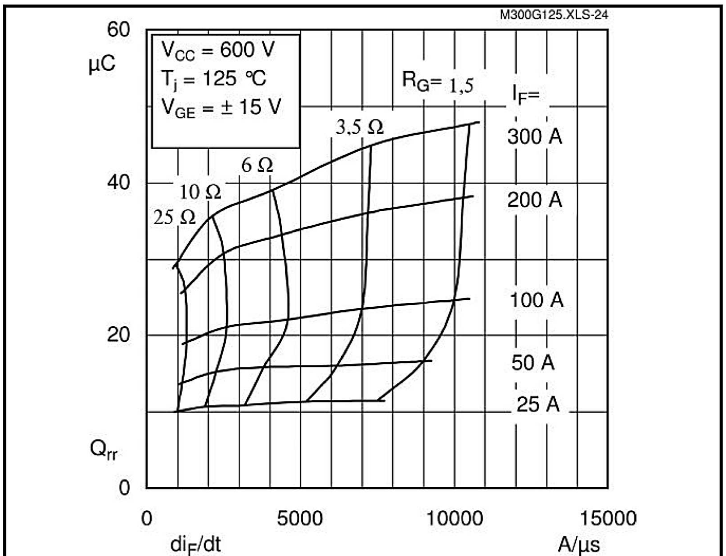


Fig. 12 Typ. CAL diode peak reverse recovery charge

UL Recognized

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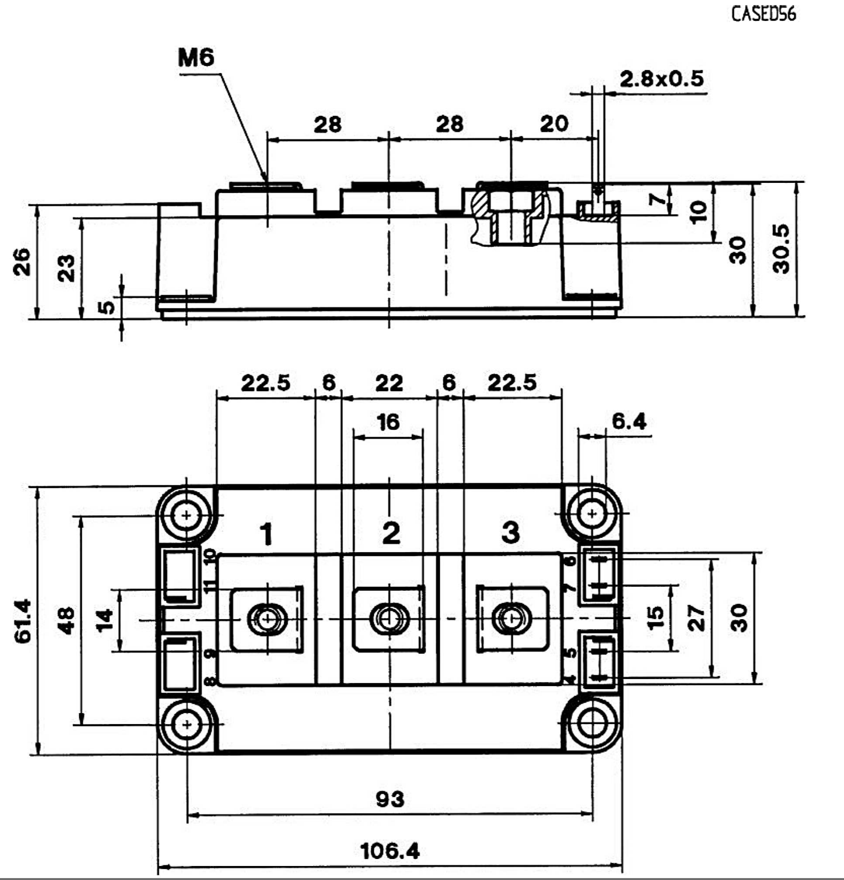
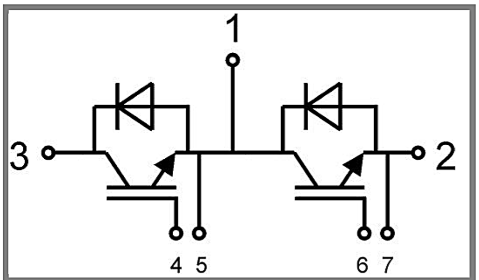



Case D 56

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Case D 56