# SKM 75GB063D ...

**SEMITRANS$^{TM}$ 2**

## Superfast NPT-IGBT Modules

**SKM 75GB063D**

**SKM 75GAR063D**

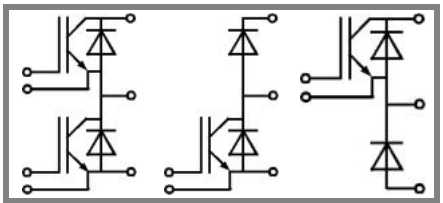
**SKM 75GAL063D**

### Features

- N channel, homogeneous Si-structure (NPT-Non punch-through IGBT)
- Low tail current with low temperature dependence
- High short circuit capability, self limiting if term. G is clamped to E
- Pos. temp.-coeff. of $V_{CEsat}$
- Very low $C_{ies}$, $C_{oes}$, $C_{res}$
- Latch-up free
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DBC Direct Copper Bonding Technology without hard mould
- Large clearance (10 mm) and creepage distances (20 mm)

### Typical Applications

- Switching (not for linear use)
- Switched mode power supplies
- UPS
- Three phase inverters for servo / AC motor speed control
- Pulse frequencies also > 10kHz



GB GAL GAR

| **Absolute Maximum Ratings** | | $T_c$ = 25 °C, unless otherwise specified | |
|---|---|---|---|
| **Symbol** | **Conditions** | **Values** | **Units** |
| **IGBT** | | | |
| $V_{CES}$ | | 600 | V |
| $I_C$ | $T_c$ = 25 (75) °C | 100 (75) | A |
| $I_{CRM}$ | $t_p$ = 1 ms | 150 | A |
| $V_{GES}$ | | ± 20 | V |
| $T_{vj}$, ($T_{stg}$) | $T_{OPERATION} \leq T_{stg}$ | - 40 ... + (125) 150 | °C |
| $V_{isol}$ | AC, 1 min. | 2500 | V |
| **Inverse diode** | | | |
| $I_F$ | $T_c$ = 25 (80) °C | 75 (50) | A |
| $I_{FRM}$ | $t_p$ = 1 ms | 150 | A |
| $I_{FSM}$ | $t_p$ = 10 ms; sin.; $T_j$ = 150 °C | 440 | A |
| **Freewheeling diode** | | | |
| $I_F$ | $T_c$ = 25 (80) °C | 100 (75) | A |
| $I_{FRM}$ | $t_p$ = 1 ms | 200 | A |
| $I_{FSM}$ | $t_p$ = 10 ms; sin; $T_j$ = 150 °C | 720 | A |

| **Characteristics** | | $T_c$ = 25 °C, unless otherwise specified | | | |
|---|---|---|---|---|---|
| **Symbol** | **Conditions** | **min.** | **typ.** | **max.** | **Units** |
| **IGBT** | | | | | |
| $V_{GE(th)}$ | $V_{GE}$ = $V_{CE}$, $I_C$ = 1 mA | 4,5 | 5,5 | 6,5 | V |
| $I_{CES}$ | $V_{GE}$ = 0, $V_{CE}$ = $V_{CES}$, $T_j$ = 25 (125) °C | | 0,1 | 0,3 | mA |
| $V_{CE(TO)}$ | $T_j$ = 25 (125) °C | | 1,05 (1) | | V |
| $r_{CE}$ | $V_{GE}$ = 15 V, $T_j$ = 25 (125) °C | | 14 (18,7) | | mΩ |
| $V_{CE(sat)}$ | $I_{Cnom}$ = 75 A, $V_{GE}$ = 15 V, chip level | | 2,1 (2,4) | 2,5 (2,8) | V |
| $C_{ies}$ | under following conditions | | 4,2 | | nF |
| $C_{oes}$ | $V_{GE}$ = 0, $V_{CE}$ = 25 V, f = 1 MHz | | 0,5 | | nF |
| $C_{res}$ | | | 0,3 | | nF |
| $L_{CE}$ | | | | 30 | nH |
| $R_{CC'+EE'}$ | res., terminal-chip $T_c$= 25 (125) °C | | 0,75 (1) | | mΩ |
| $t_{d(on)}$ | $V_{CC}$ = 300 V, $I_{Cnom}$ = 75 A | | 60 | | ns |
| $t_r$ | $R_{Gon}$ = $R_{Goff}$ = 15 Ω, $T_j$ = 125 °C | | 50 | | ns |
| $t_{d(off)}$ | $V_{GE}$ = ± 15 V | | 350 | | ns |
| $t_f$ | | | 35 | | ns |
| $E_{on}$ ($E_{off}$) | | | 3 (2,5) | | mJ |
| **Inverse diode** | | | | | |
| $V_F$ = $V_{EC}$ | $I_{Fnom}$ = 75 A; $V_{GE}$ = 0 V; $T_j$ = 25 (125) °C | | 1,55 (1,55) | 1,9 | V |
| $V_{(TO)}$ | $T_j$ = 125 () °C | | | 0,9 | V |
| $r_T$ | $T_j$ = 125 () °C | | 10 | 13,3 | mΩ |
| $I_{RRM}$ | $I_{Fnom}$ = 75 A; $T_j$ = 125 ( ) °C | | 30 | | A |
| $Q_{rr}$ | di/dt = 800 A/µs | | 3,7 | | µC |
| $E_{rr}$ | $V_{GE}$ = 0 V | | | | mJ |
| **FWD** | | | | | |
| $V_F$ = $V_{EC}$ | $I_F$ = 100 A; $V_{GE}$ = 0 V, $T_j$ = 25 (125) °C | | 1,55 (1,55) | 1,9 | V |
| $V_{(TO)}$ | $T_j$ = 125 () °C | | | 0,9 | V |
| $r_T$ | $T_j$ = 125 () °C | | 8 | 10 | mΩ |
| $I_{RRM}$ | $I_F$ = 100 A; $T_j$ = 125 ( ) °C | | 44 | | A |
| $Q_{rr}$ | di/dt = 0 A/µs | | 6 | | µC |
| $E_{rr}$ | $V_{GE}$ = V | | | | mJ |
| **Thermal characteristics** | | | | | |
| $R_{th(j-c)}$ | per IGBT | | | 0,35 | K/W |
| $R_{th(j-c)D}$ | per Inverse Diode | | | 1 | K/W |
| $R_{th(j-c)FD}$ | per FWD | | | 0,6 | K/W |
| $R_{th(c-s)}$ | per module | | | 0,05 | K/W |
| **Mechanical data** | | | | | |
| $M_s$ | to heatsink M6 | 3 | | 5 | Nm |
| $M_t$ | to terminals M5 | 2,5 | | 5 | Nm |
| w | | | | 160 | g |

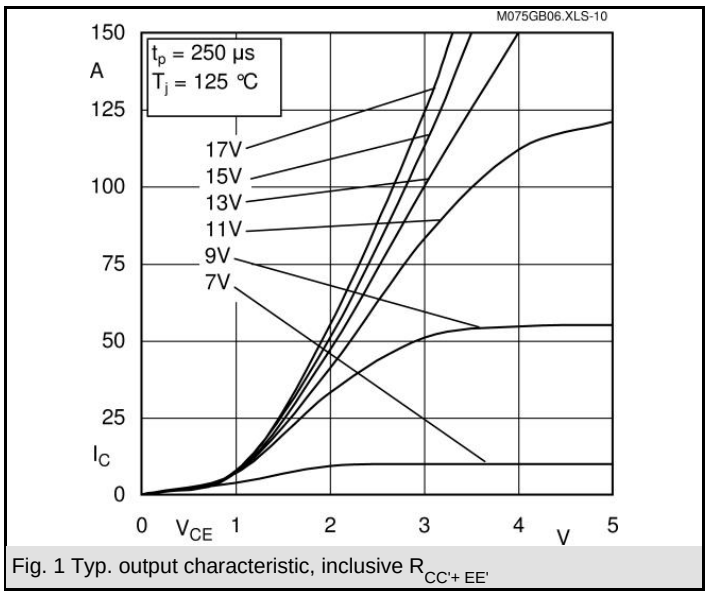



Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

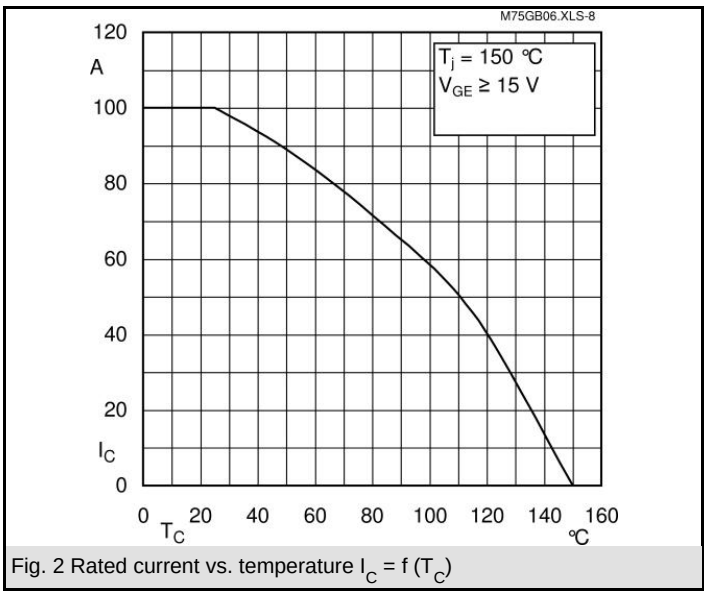



Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

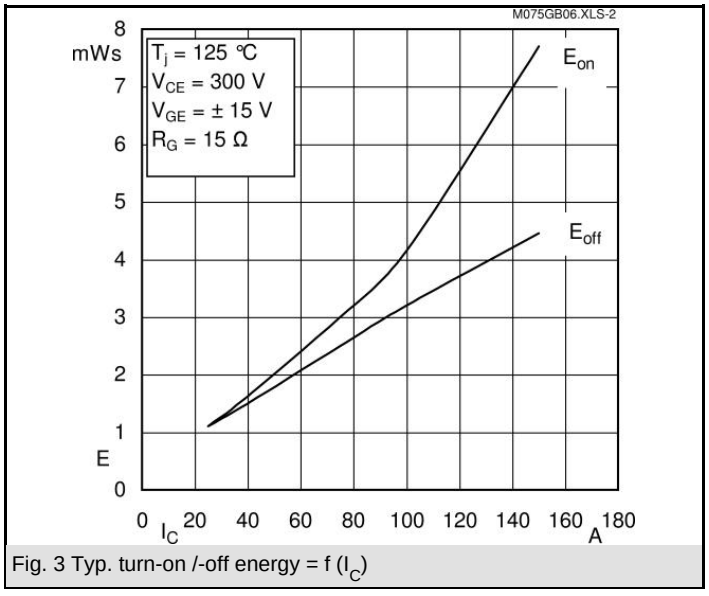



Fig. 3 Typ. turn-on /-off energy = f ($I_C$)

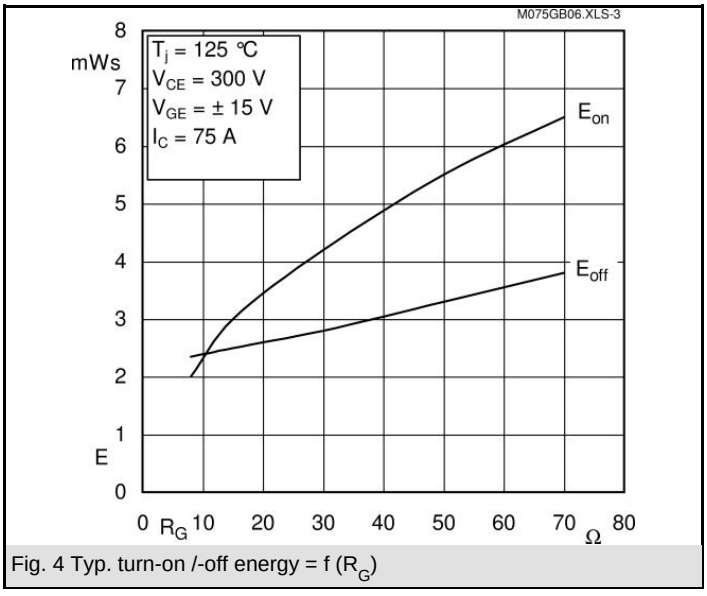



Fig. 4 Typ. turn-on /-off energy = f ($R_G$)

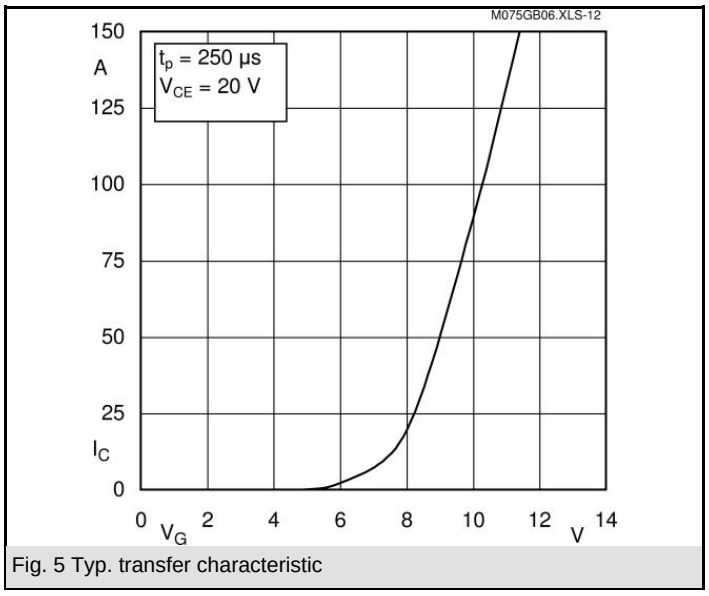



Fig. 5 Typ. transfer characteristic

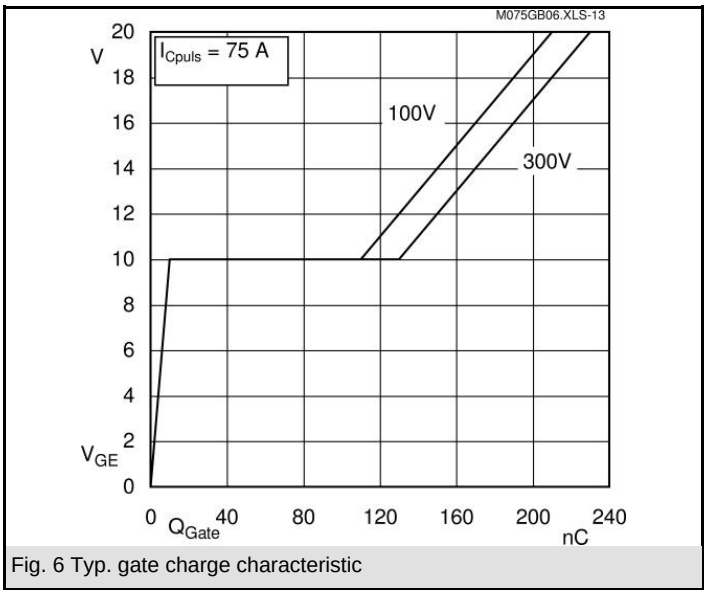



Fig. 6 Typ. gate charge characteristic

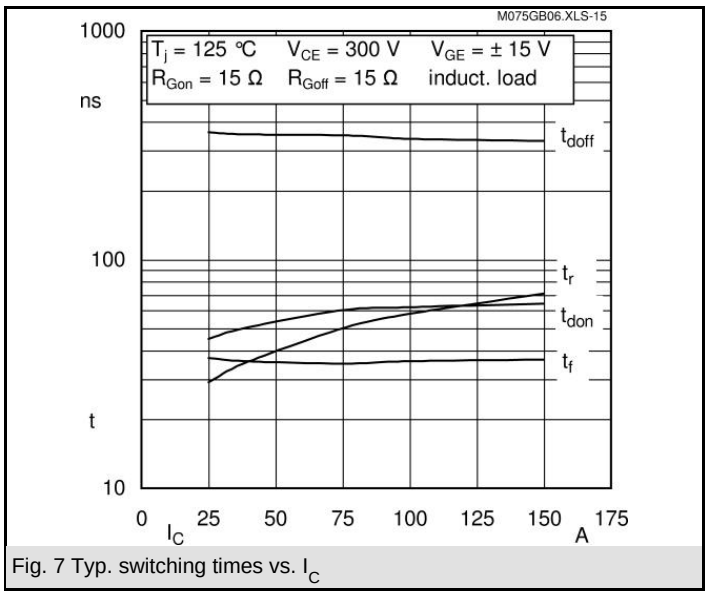



Fig. 7 Typ. switching times vs. $I_C$

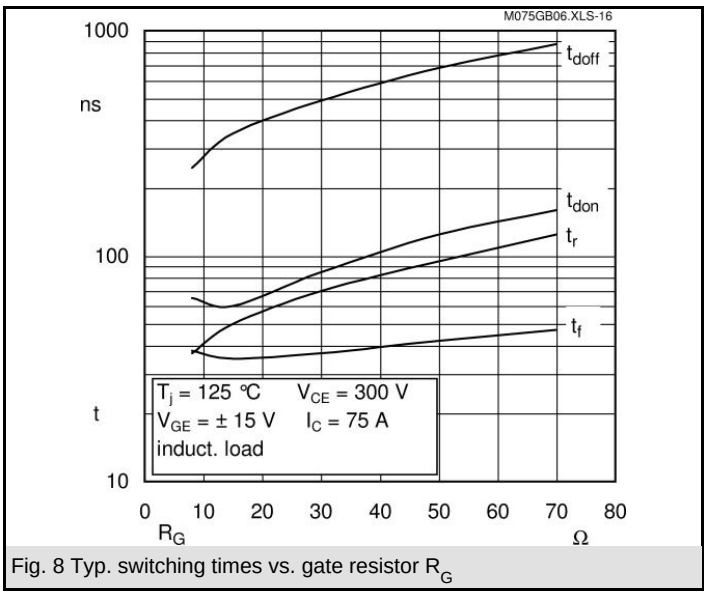



Fig. 8 Typ. switching times vs. gate resistor $R_G$

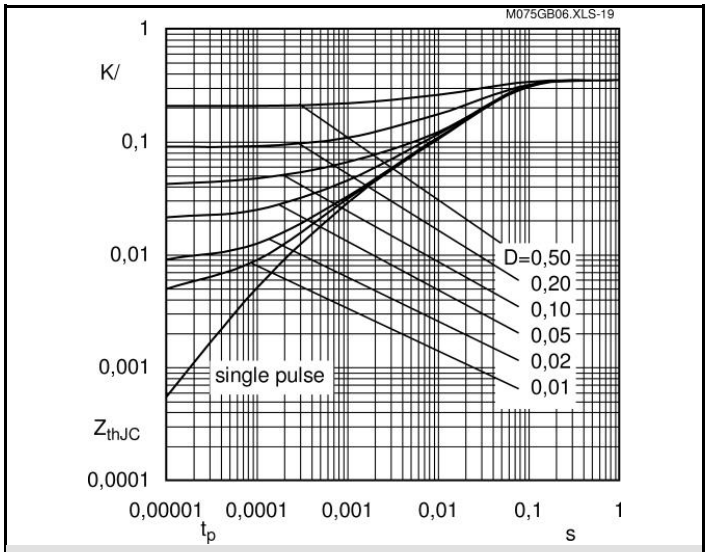



Fig. 9 Transient thermal impedance of IGBT

$Z_{thp(j-c)} = f(t_p)$; $D = t_p/t_c = t_p * f$

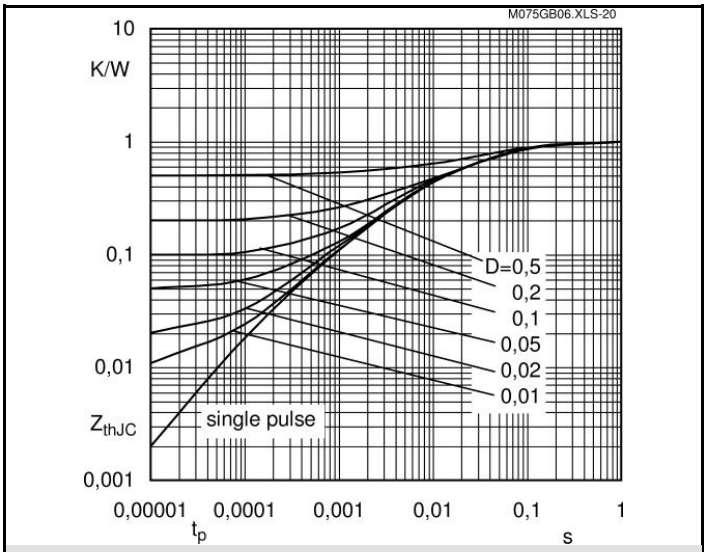



Fig. 10 Transient thermal impedance of FWD

$Z_{thp(j-c)} = f(t_p)$; $D = t_p/t_c = t_p * f$

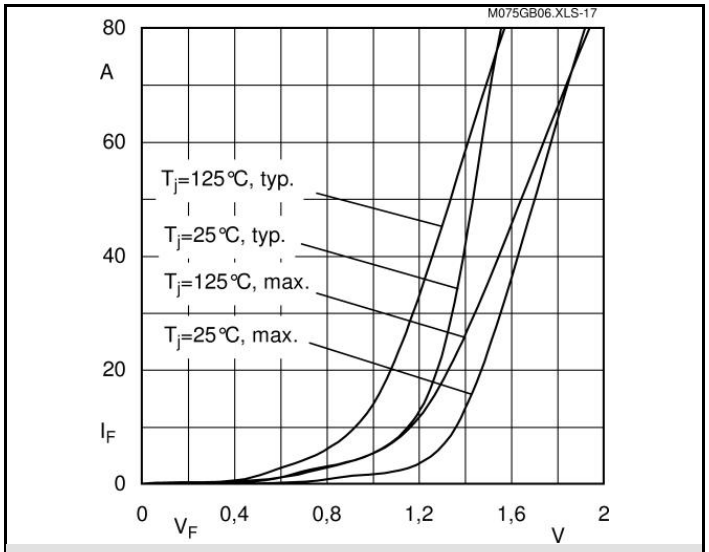



Fig. 11 CAL diode forward characteristic

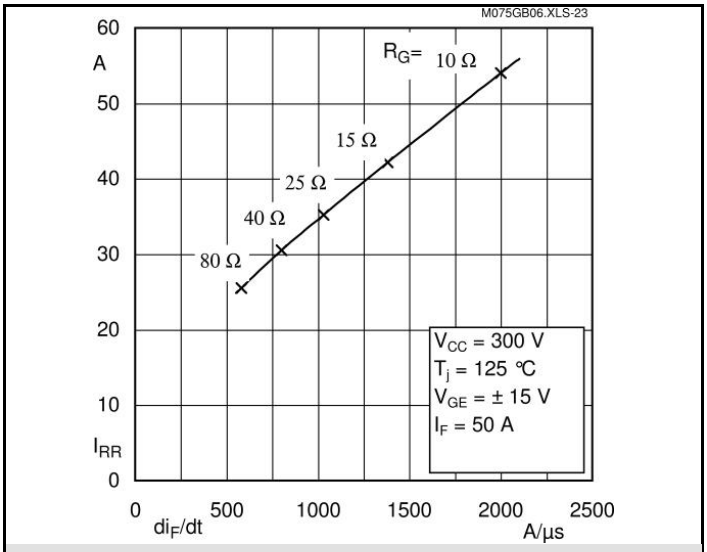



Fig. 12 Typ. CAL diode peak reverse recovery current

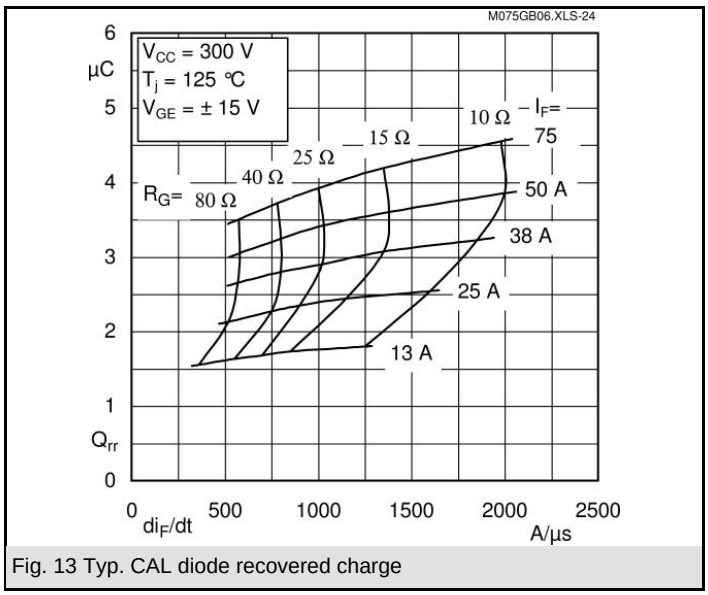
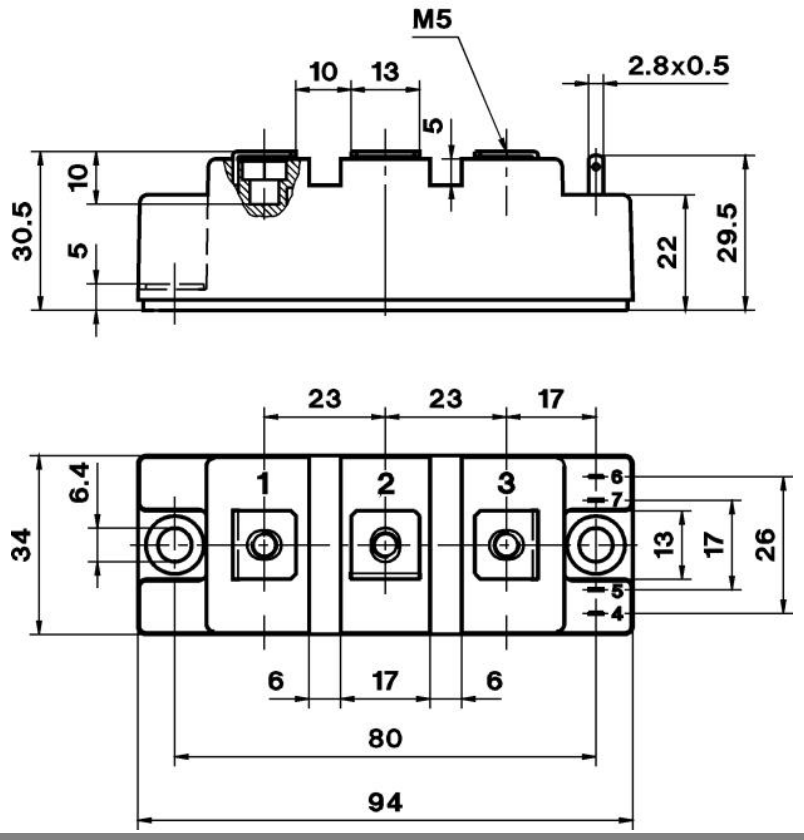



Fig. 13 Typ. CAL diode recovered charge

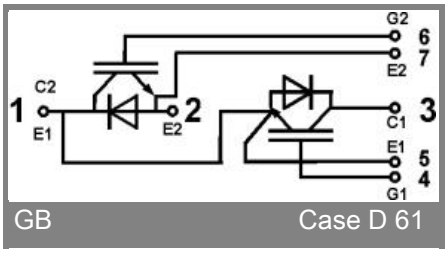
UL Recognized
File no. E 63 532

Dimensions in mm

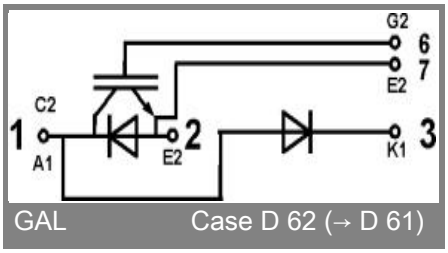
CASED61



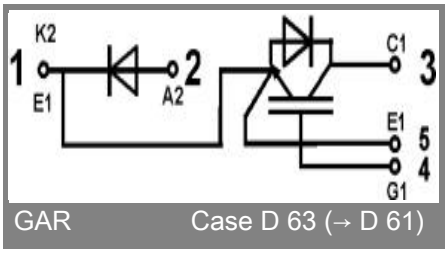

Case D 61




GB Case D 61




GAL Case D 62 (→ D 61)




GAR Case D 63 (→ D 61)

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

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