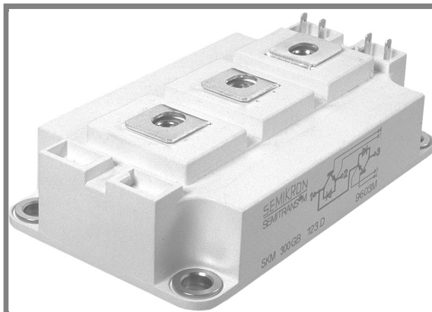
# SKM 150GB123D



**SEMITRANS[TM] 3**

## IGBT Modules

www.DataSheet4U.com

**SKM 150GB123D**

**SKM 150GAL123D**

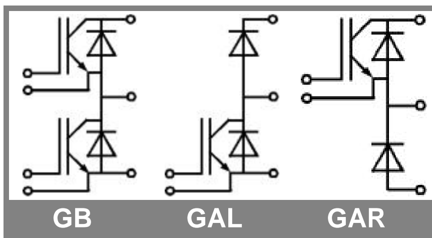
**SKM 150GAR123D**

### Features

- MOS input (voltage controlled)
- N channel, Homogeneous Si
- Low inductance case
- Very low tail current with low temperature dependence
- High short circuit capability, self limiting to 6 x $I_{cnom}$
- Latch-up free
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DCB Direct Copper Bonding
- Large clearance (12 mm) and creepage distances (20 mm)

### Typical Applications

- Switching (not for linear use)




| Absolute Maximum Ratings | | $T_c$ = 25 °C, unless otherwise specified | |
|---|---|---|---|
| **Symbol** | **Conditions** | **Values** | **Units** |
| **IGBT** | | | |
| $V_{CES}$ | | 1200 | V |
| $I_C$ | $T_c$ = 25 (80) °C | 150 (110) | A |
| $I_{CRM}$ | $t_p$ = 1 ms | 200 | A |
| $V_{GES}$ | | ± 20 | V |
| $T_{vj}$, ($T_{stg}$) | $T_{OPERATION} \le T_{stg}$ | - 40 ... + 150 (125) | °C |
| $V_{isol}$ | AC, 1 min. | 2500 | V |
| **Inverse diode** | | | |
| $I_F$ | $T_c$ = 25 (80) °C | 150 (100) | A |
| $I_{FRM}$ | $t_p$ = 1 ms | 200 | A |
| $I_{FSM}$ | $t_p$ = 10 ms; sin.; $T_j$ = 150 °C | 1100 | A |
| **Freewheeling diode** | | | |
| $I_F$ | $T_c$ = 25 (80) °C | 200 (135) | A |
| $I_{FRM}$ | $t_p$ = 1 ms | 300 | A |
| $I_{FSM}$ | $t_p$ = 10 ms; sin.; $T_j$ = 150 °C | 1450 | A |

| Characteristics | | | $T_c$ = 25 °C, unless otherwise specified | | |
|---|---|---|---|---|---|
| **Symbol** | **Conditions** | **min.** | **typ.** | **max.** | **Units** |
| **IGBT** | | | | | |
| $V_{GE(th)}$ | $V_{GE} = V_{CE}$, $I_C$ = 4 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 | | 1,4 (1,6) | 1,6 (1,8) | V |
| $r_{CE}$ | $V_{GE}$ = 15 V, $T_j$ = 25 (125) °C | | 11 (15) | 14 (19) | mΩ |
| $V_{CE(sat)}$ | $I_{Cnom}$ = 100 A, $V_{GE}$ = 15 V, chip level | | 2,5 (3,1) | 3 (3,7) | V |
| $C_{ies}$ | under following conditions | | 6,5 | 8,5 | nF |
| $C_{oes}$ | $V_{GE}$ = 0, $V_{CE}$ = 25 V, f = 1 MHz | | 1 | 1,5 | nF |
| $C_{res}$ | | | 0,5 | 0,6 | nF |
| $L_{CE}$ | | | | 20 | nH |
| $R_{CC'+EE'}$ | res., terminal-chip $T_c$= 25 (125) °C | | 0,35 (0,5) | | mΩ |
| $t_{d(on)}$ | $V_{CC}$ = 600 V, $I_{Cnom}$ = 100 A | | 160 | 320 | ns |
| $t_r$ | $R_{Gon} = R_{Goff}$ = 6,8 Ω, $T_j$ = 125 °C | | 80 | 160 | ns |
| $t_{d(off)}$ | $V_{GE}$ = ± 15 V | | 400 | 520 | ns |
| $t_f$ | | | 70 | 100 | ns |
| $E_{on}$ ($E_{off}$) | | | 13 (11) | | mJ |
| **Inverse diode** | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom}$ = 100 A; $V_{GE}$ = 0 V; $T_j$ = 25 (125) °C | | 2 (1,8) | 2,5 | V |
| $V_{(TO)}$ | $T_j$ = 125 () °C | | | 1,2 | V |
| $r_T$ | $T_j$ = 125 () °C | | 8 | 11 | mΩ |
| $I_{RRM}$ | $I_{Fnom}$ = 100 A; $T_j$ = 25 ( 125 ) °C | | 35 (50) | | A |
| $Q_{rr}$ | di/dt = 1000 A/µs | | 5 (14) | | µC |
| $E_{rr}$ | $V_{GE}$ = V | | | | mJ |
| **FWD** | | | | | |
| $V_F = V_{EC}$ | $I_F$ = 150 A; $V_{GE}$ = 0 V, $T_j$ = 25 (125) °C | | 2 (1,8) | 2,5 | V |
| $V_{(TO)}$ | $T_j$ = 125 () °C | | | 1,2 | V |
| $r_T$ | $T_j$ = 125 () °C | | 5 | 8,7 | mΩ |
| $I_{RRM}$ | $I_F$ = 100 A; $T_j$ = 25 (125 ) °C | | 40 (65) | | A |
| $Q_{rr}$ | di/dt = A/µs | | 5 (15) | | µC |
| $E_{rr}$ | $V_{GE}$ = V | | | | mJ |
| **Thermal characteristics** | | | | | |
| $R_{th(j-c)}$ | per IGBT | | | 0,15 | K/W |
| $R_{th(j-c)D}$ | per Inverse Diode | | | 0,3 | K/W |
| $R_{th(j-c)FD}$ | per FWD | | | 0,25 | K/W |
| $R_{th(c-s)}$ | per module | | | 0,038 | K/W |
| **Mechanical data** | | | | | |
| $M_s$ | to heatsink M6 | 3 | | 5 | Nm |
| $M_t$ | to terminals M6 | 2,5 | | 5 | Nm |
| w | | | | 325 | g |


www.DataSheet4U.com

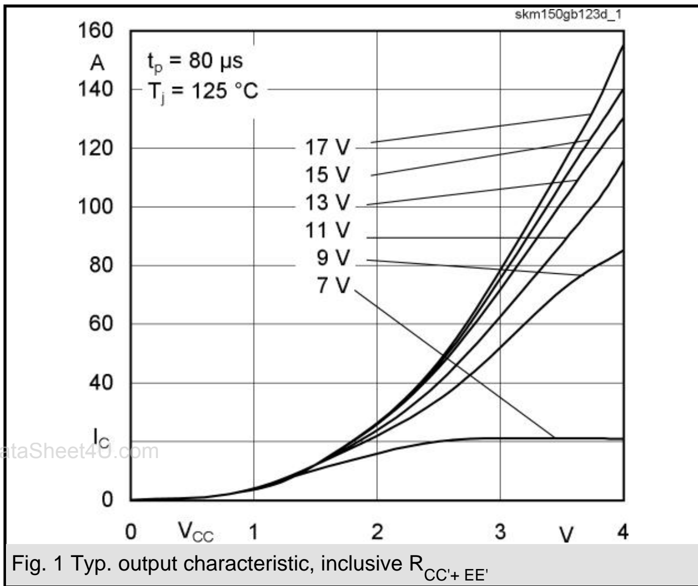


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

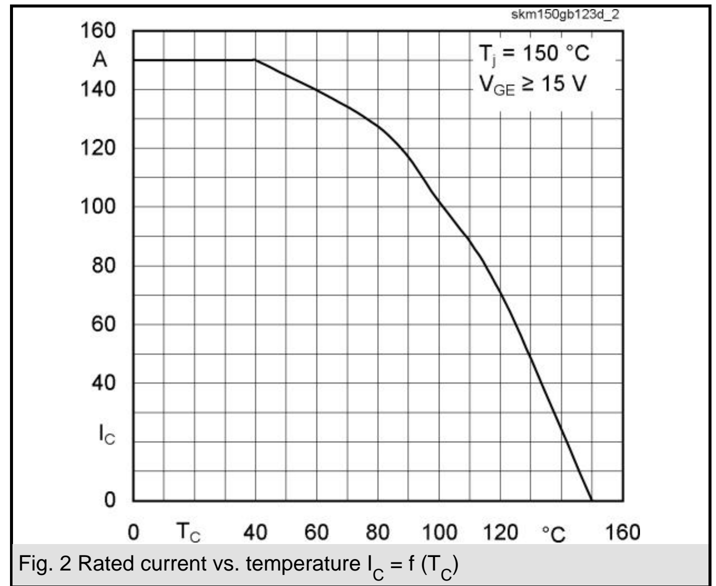


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

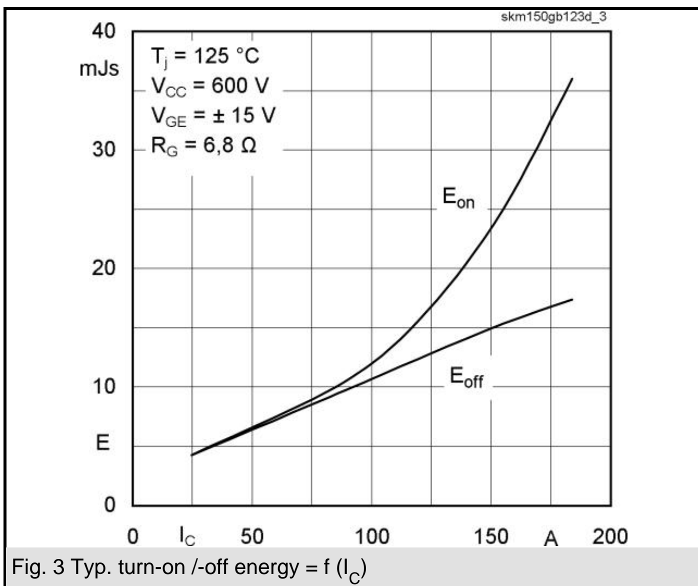


Fig. 3 Typ. turn-on /-off energy = f ($I_C$)

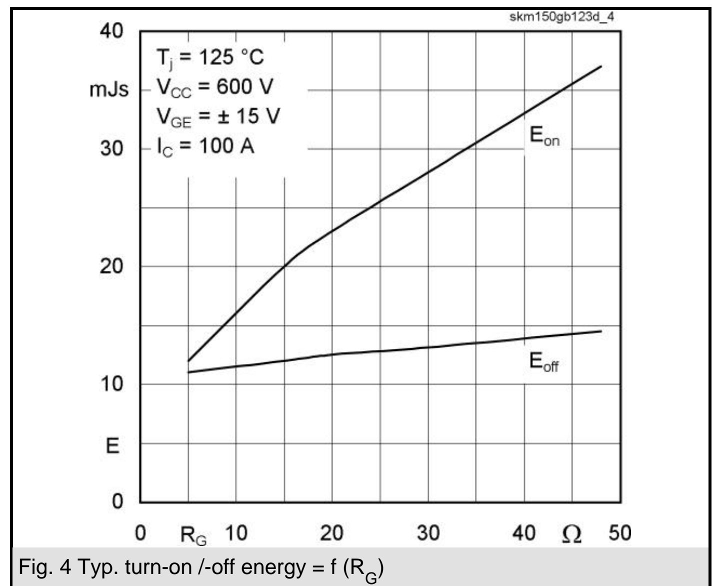


Fig. 4 Typ. turn-on /-off energy = f ($R_G$)

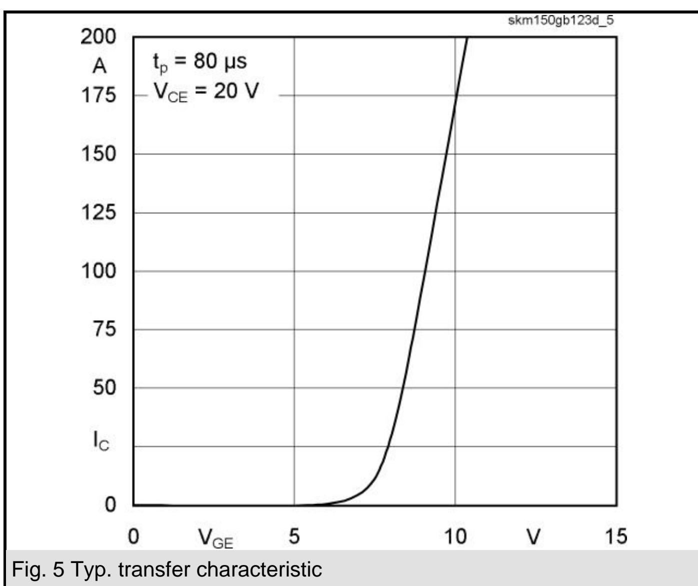


Fig. 5 Typ. transfer characteristic

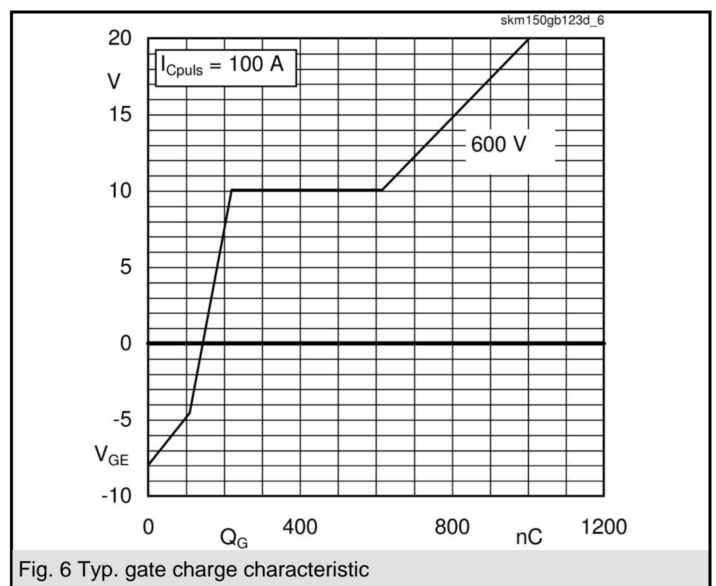


Fig. 6 Typ. gate charge characteristic


www.DataSheet4U.com

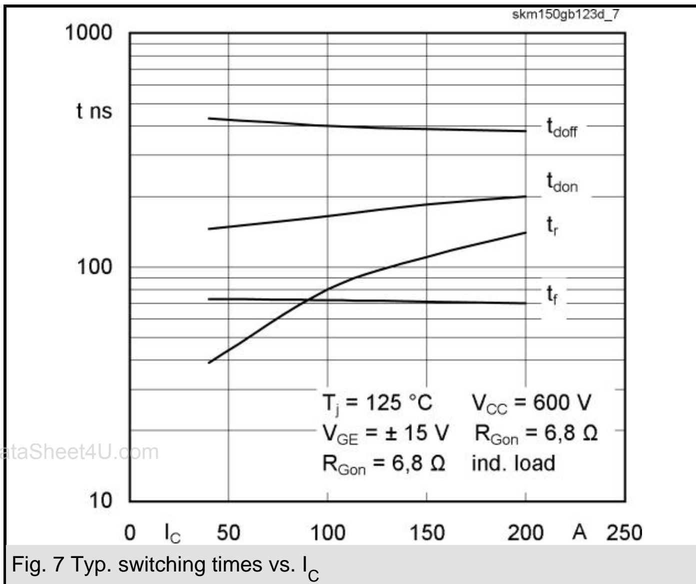



Fig. 7 Typ. switching times vs. $I_C$

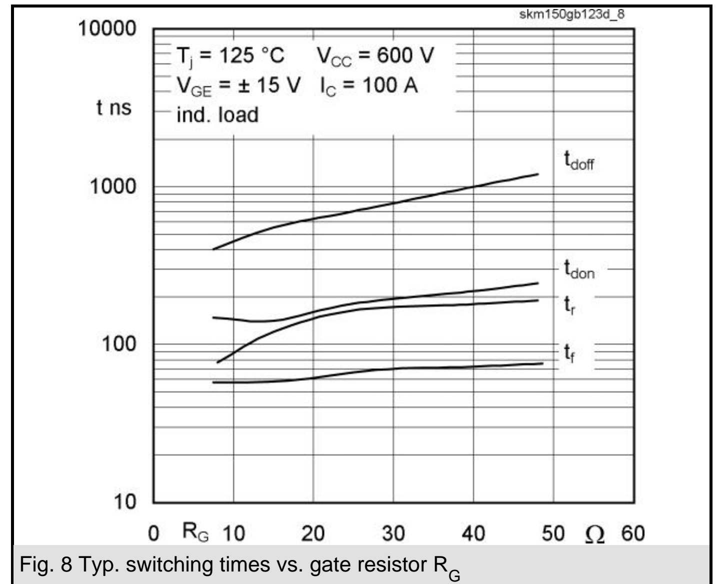



Fig. 8 Typ. switching times vs. gate resistor $R_G$

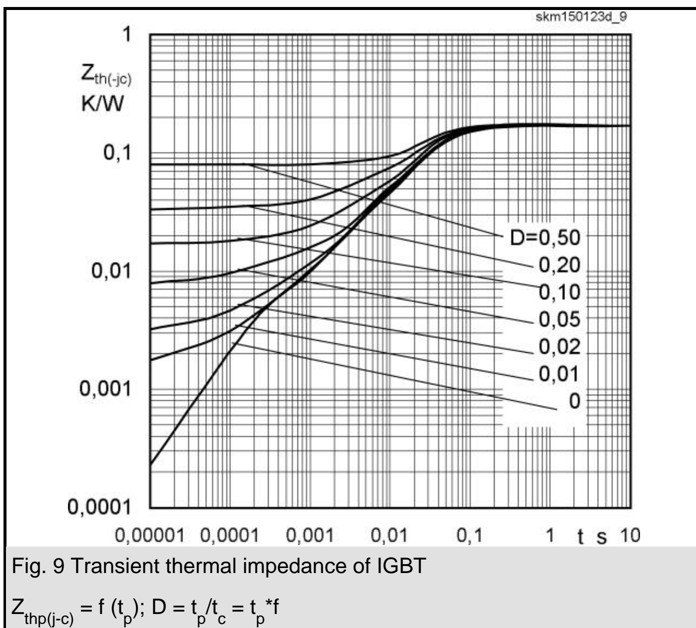



Fig. 9 Transient thermal impedance of IGBT

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

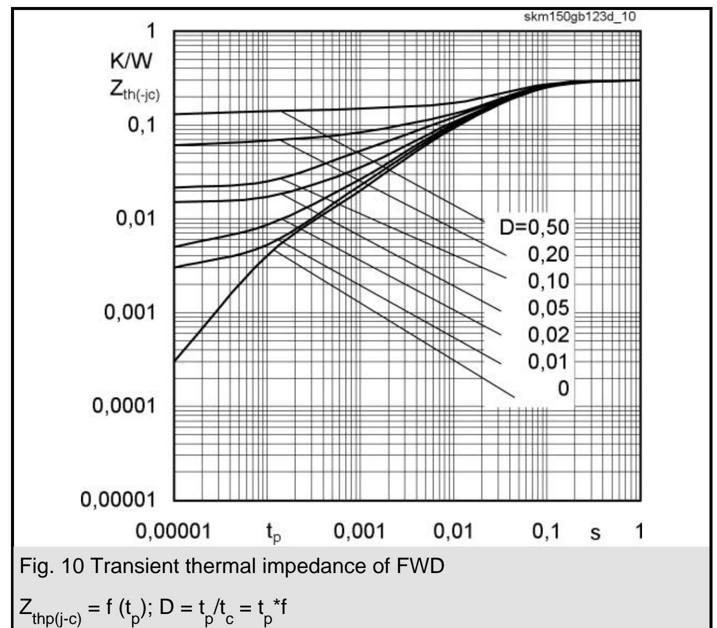



Fig. 10 Transient thermal impedance of FWD

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

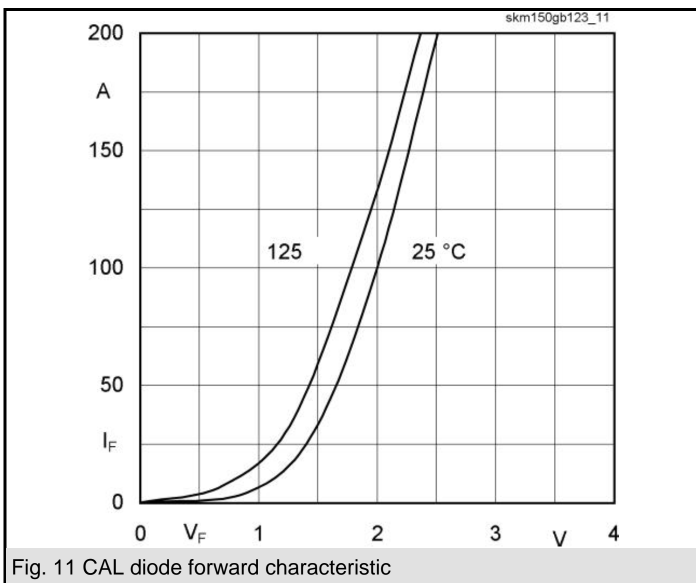



Fig. 11 CAL diode forward characteristic

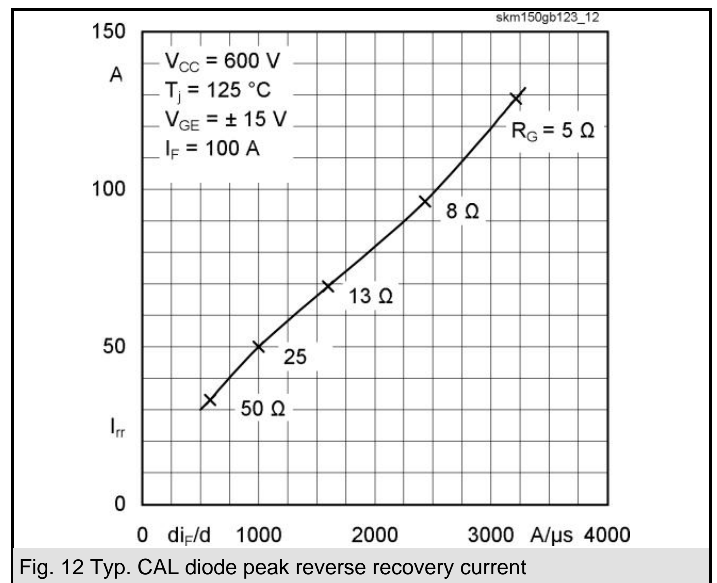



Fig. 12 Typ. CAL diode peak reverse recovery current


www.DataSheet4U.com

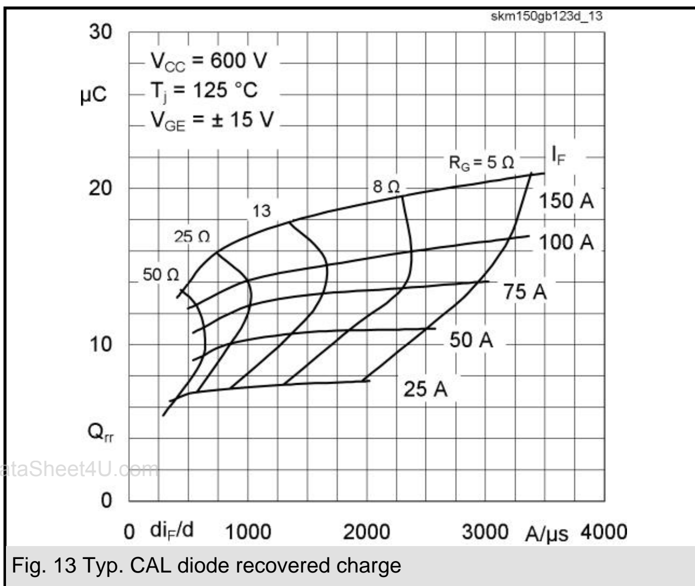
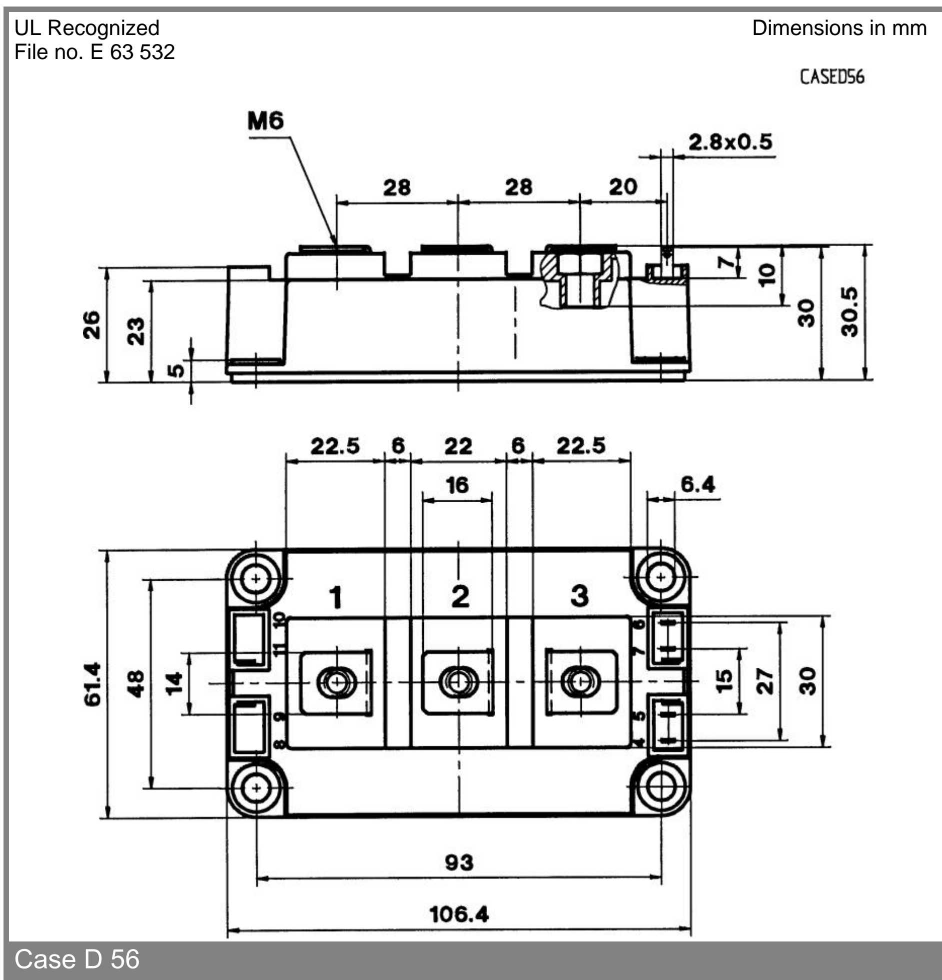
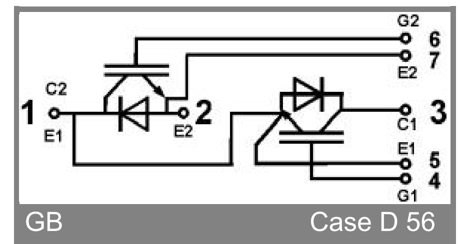


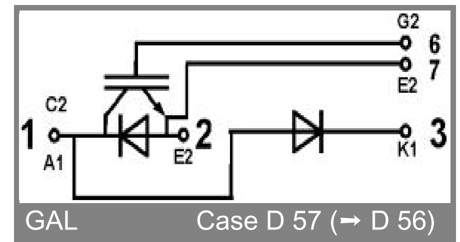

Fig. 13 Typ. CAL diode recovered charge



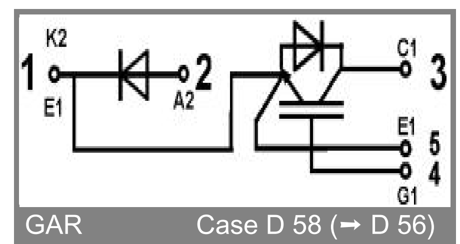

Case D 56




GB Case D 56




GAL Case D 57 (➞ D 56)




GAR Case D 58 (➞ D 56)

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.


www.DataSheet4U.com