# SKiM 601GD126DM



**SKiM® 5**

## IGBT Modules

**SKiM 601GD126DM**

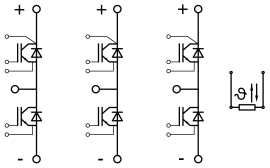
Preliminary Data

### Features

- Trench gate IGBT with field stop layer
- Low inductance case
- Fast & soft inverse CAL diodes
- Isolated by AIN DCB (Direct Copper Bonded) ceramic plate
- Pressure contact technology for thermal contacts
- Spring contact system to attach driver PCB to the control terminals
- Integrated temperature sensor

### Typical Applications

- Switched mode power supplies
- Three phase inverters for AC motor speed control



**GD**

| **Absolute Maximum Ratings** | $T_c$ = 25 °C, unless otherwise specified | | |
|---|---|---|---|
| **Symbol** | **Conditions** | **Values** | **Units** |
| **IGBT** | | | |
| $V_{CES}$ | | 1200 | V |
| $I_C$ | $T_s$ = 25 (70) °C | 480 (370) | A |
| $I_{CRM}$ | $t_p$ = 1 ms | 900 | A |
| $V_{GES}$ | | ± 20 | V |
| $T_j$ ($T_{stg}$) | | - 40 ... + 150 (125) | °C |
| $T_{cop}$ | max. case operating temperature | 125 | °C |
| $V_{isol}$ | AC, 1 min. | 2500 | V |
| **Inverse diode** | | | |
| $I_F$ | $T_s$ = 25 (70) °C | 450 (340) | A |
| $I_{FRM}$ | $t_p$ = 1 ms | 900 | A |
| $I_{FSM}$ | $t_p$ = 10 ms; sin.; $T_j$ = 150 °C | 3300 | A |

| **Characteristics** | $T_c$ = 25 °C, unless otherwise specified | | | | |
|---|---|---|---|---|---|
| **Symbol** | **Conditions** | **min.** | **typ.** | **max.** | **Units** |
| **IGBT** | | | | | |
| $V_{GE(th)}$ | $V_{GE}$ = $V_{CE}$; $I_C$ = 18 mA | 4,95 | 5,8 | 6,55 | V |
| $I_{CES}$ | $V_{GE}$ = 0; $V_{CE}$ = $V_{CES}$; $T_j$ = 125 °C | | | 0,6 | mA |
| $V_{CEO}$ | $T_j$ = 25 (125) °C | | 1 (0,9) | 1,2 (1,1) | V |
| $r_{CE}$ | $T_j$ = 25 (125) °C | | 1,6 (2,4) | 2,1 (3) | mΩ |
| $V_{CEsat}$ | $I_{Cnom}$ = 450 A; $V_{GE}$ = 15 V, $T_j$ = 25 (125) °C on chip level | | 1,7 (2) | 2,15 (2,45) | V |
| $C_{ies}$ | $V_{GE}$ = 0; $V_{CE}$ = 25 V; f = 1 MHz | | 35 | | nF |
| $C_{oes}$ | $V_{GE}$ = 0; $V_{CE}$ = 25 V; f = 1 MHz | | 2,5 | | nF |
| $C_{res}$ | $V_{GE}$ = 0; $V_{CE}$ = 25 V; f = 1 MHz | | 2,4 | | nF |
| $L_{CE}$ | | | | 20 | nH |
| $R_{CC'+EE'}$ | resistance, terminal-chip $T_c$= 25 (125) °C | | 0,9 (1,1) | | mΩ |
| $t_{d(on)}$ | $V_{CC}$ = 600 V | | 250 | | ns |
| $t_r$ | $I_{Cnom}$ = 450 A | | 55 | | ns |
| $t_{d(off)}$ | $R_{Gon}$ = $R_{Goff}$ = 3 Ω | | 800 | | ns |
| $t_f$ | $T_j$ = 125 °C | | 120 | | ns |
| $E_{on}$ ($E_{off}$) | $V_{GE}$ ± 15 V | | 42 (70) | | mJ |
| $E_{on}$ ($E_{off}$) | with SKHI 65; $T_j$ = 125 °C $V_{CC}$ = 600 V; $I_C$ = 450 A | | | | mJ |
| **Inverse diode** | | | | | |
| $V_F$ = $V_{EC}$ | $I_{Fnom}$ = 300 A; $V_{GE}$ = 0 V; $T_j$ = 25 (125) °C | | 2 (1,8) | 2,55 (2,3) | V |
| $V_{TO}$ | $T_j$ = 25 (125) °C | | 1,1 | 1,45 (1,25) | V |
| $r_T$ | $T_j$ = 25 (125) °C | | 3,3 | 3,5 (3,5) | mΩ |
| $I_{RRM}$ | $I_F$ = 450 A; $T_j$ = 125 °C | | | | A |
| $Q_{rr}$ | $V_{GE}$ = V di/dt = A/µs | | | | µC |
| $E_{rr}$ | $R_{Gon}$ = $R_{Goff}$ = | | | | mJ |
| **Thermal characteristics** | | | | | |
| $R_{th(j-s)}$ | per IGBT | | | 0,09 | K/W |
| $R_{th(j-s)}$ | per FWD | | | 0,125 | K/W |
| **Temperature Sensor** | | | | | |
| $R_{TS}$ | T = 25 (100) °C | | 1 (1,67) | | kΩ |
| tolerance | T = 25 (100) °C | | 3 (2) | | % |
| **Mechanical data** | | | | | |
| $M_1$ | to heatsink (M5) | 2 | | 3 | Nm |
| $M_2$ | for terminals (M6) | 4 | | 5 | Nm |
| w | | | | 460 | g |


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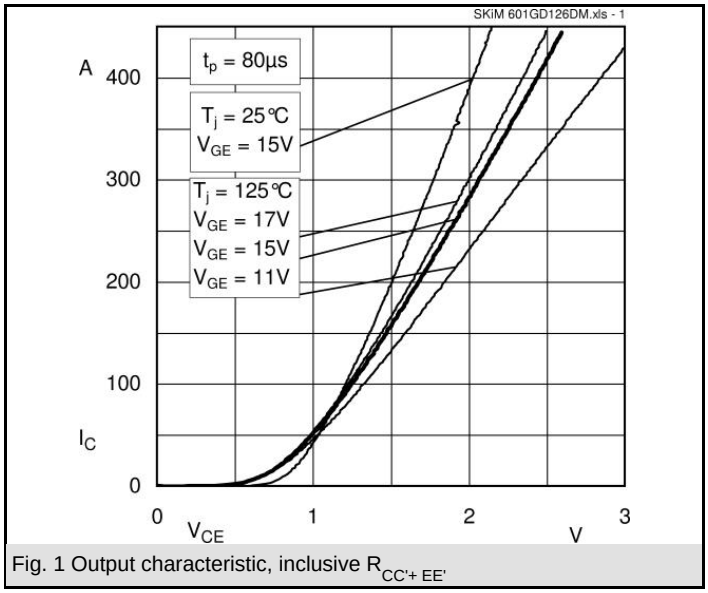



Fig. 1 Output characteristic, inclusive $R_{CC'+ EE'}$

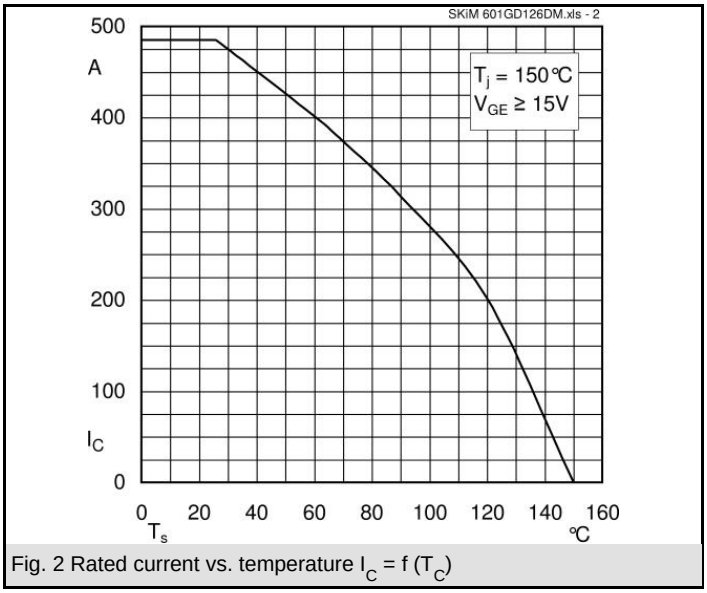



Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

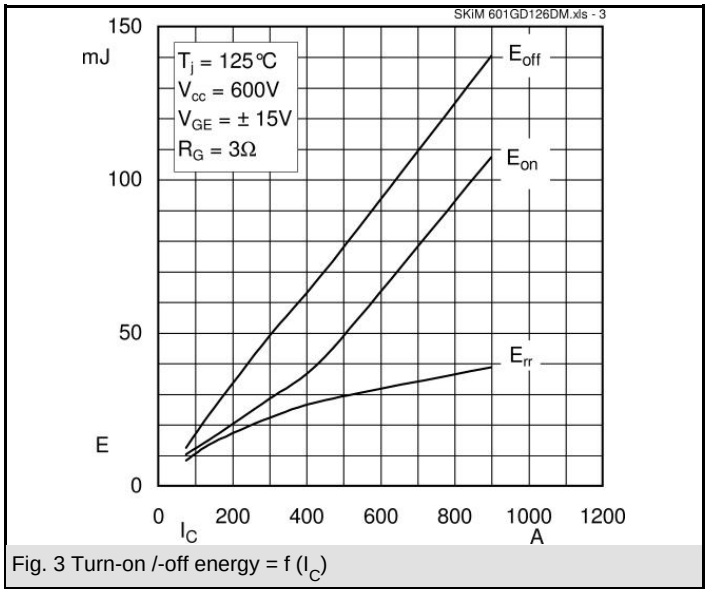



Fig. 3 Turn-on /-off energy = f ($I_C$)

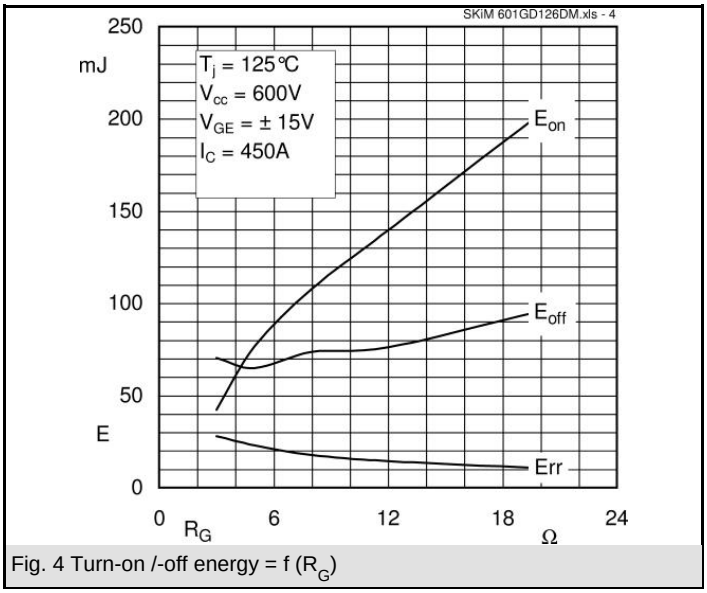



Fig. 4 Turn-on /-off energy = f ($R_G$)

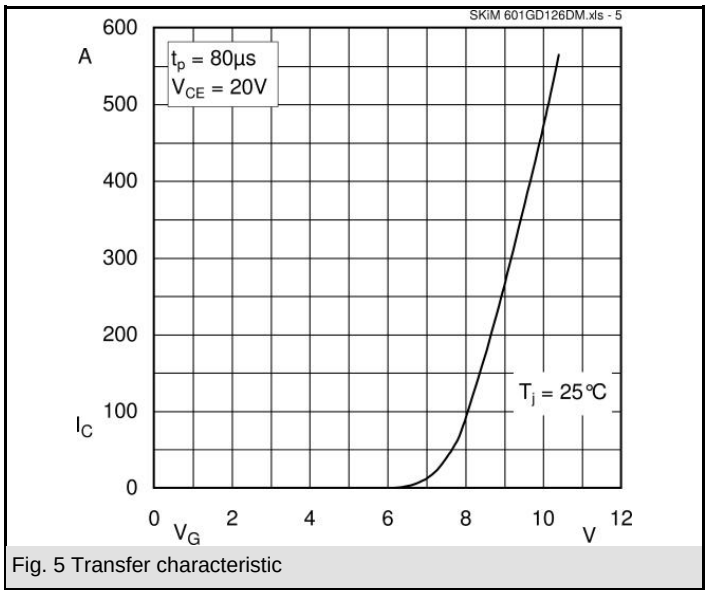



Fig. 5 Transfer characteristic

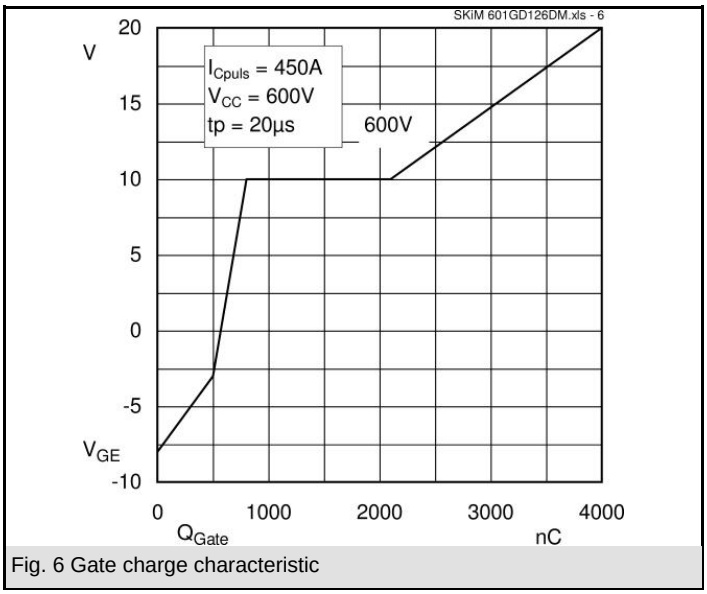



Fig. 6 Gate charge characteristic

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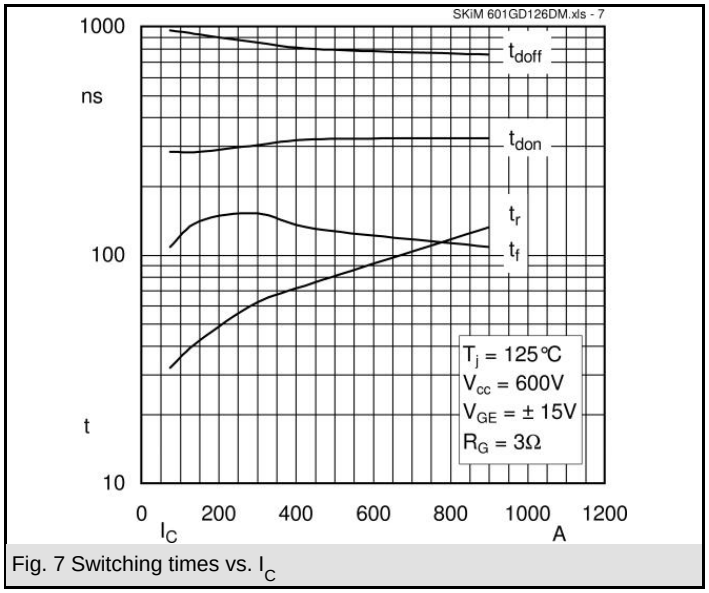



Fig. 7 Switching times vs. $I_C$

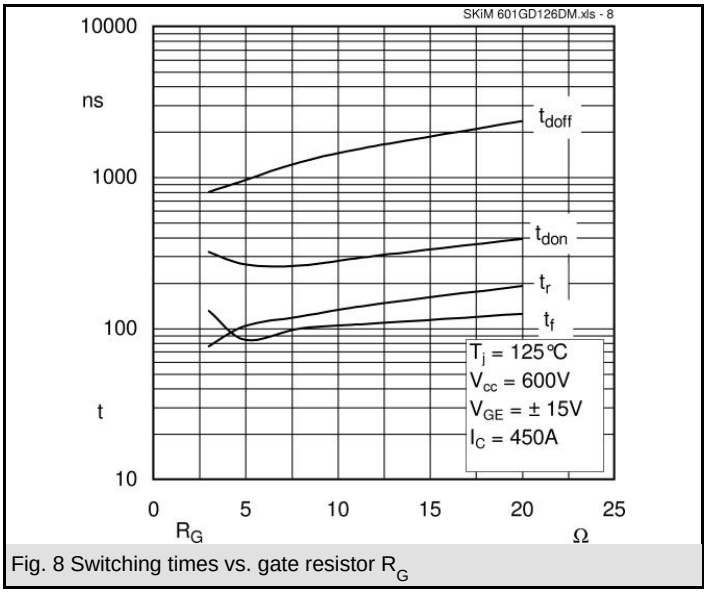



Fig. 8 Switching times vs. gate resistor $R_G$

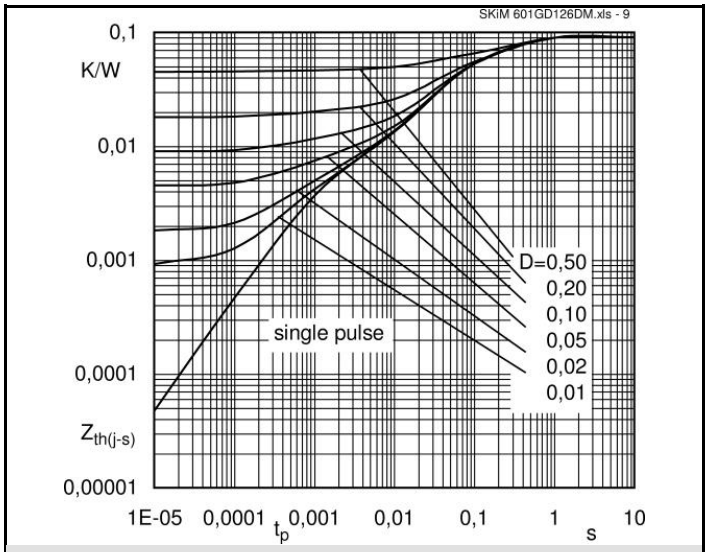



Fig. 9 Transient thermal impedance of IGBT

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

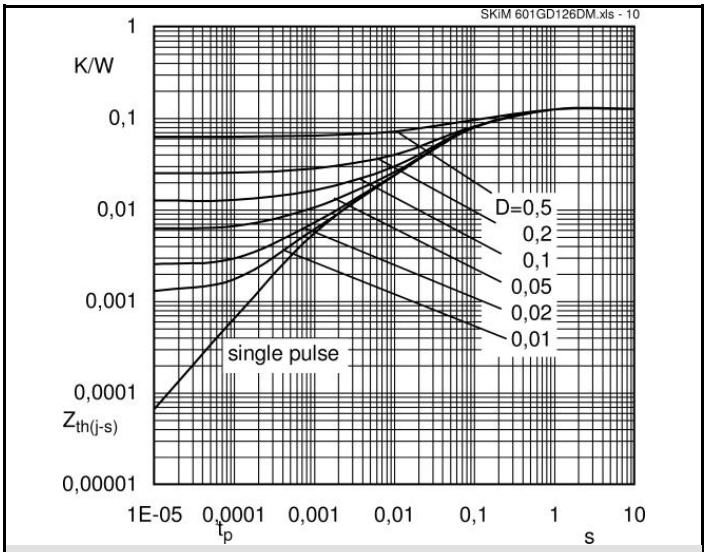



Fig. 10 Transient thermal impedance of FWD

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

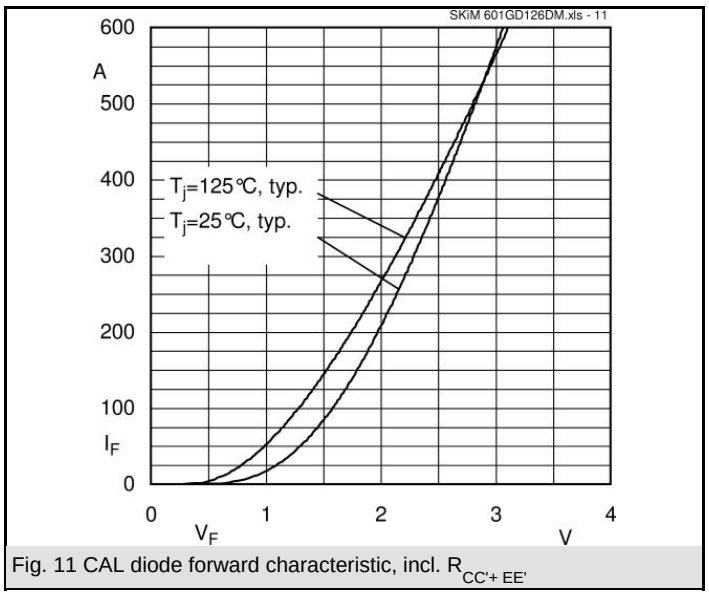
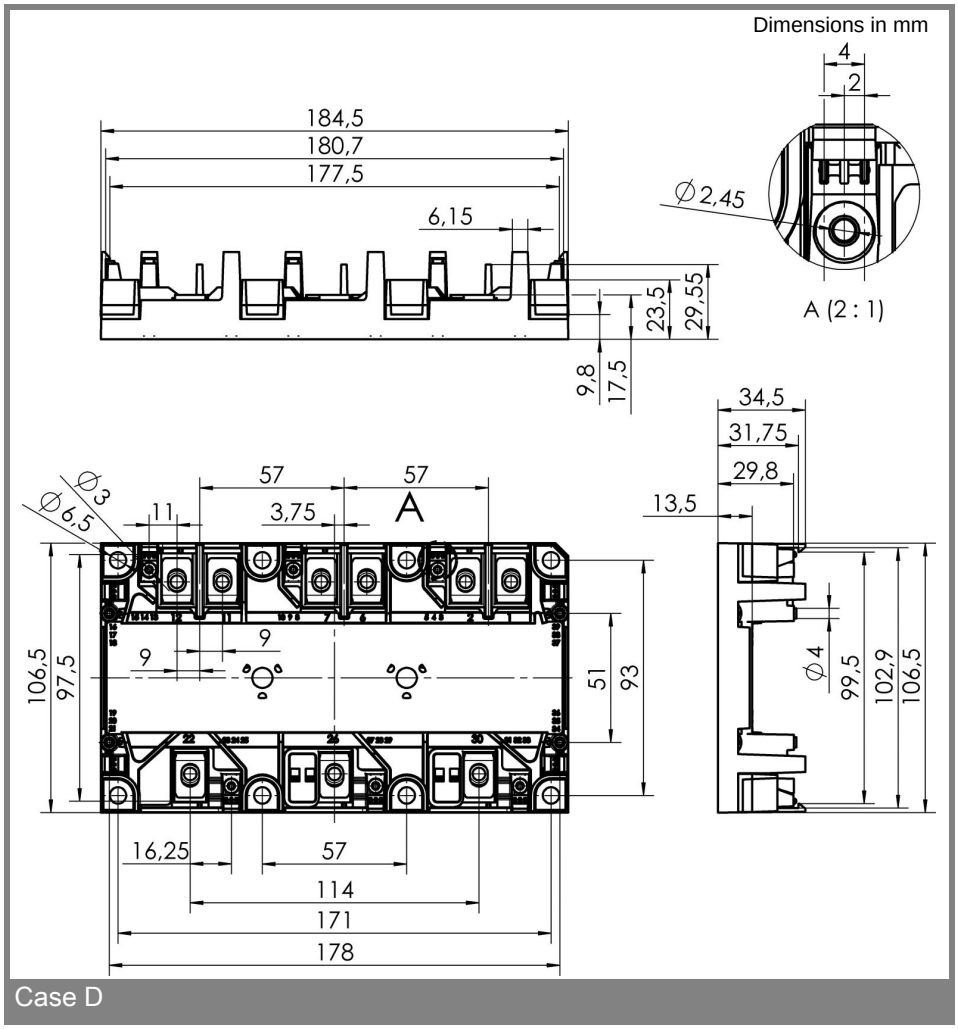
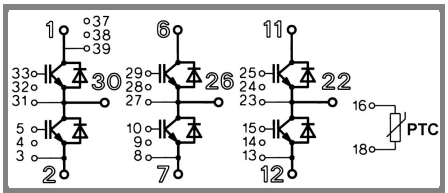



Fig. 11 CAL diode forward characteristic, incl. $R_{CC'+ EE'}$

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Case D




GD Case D

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

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