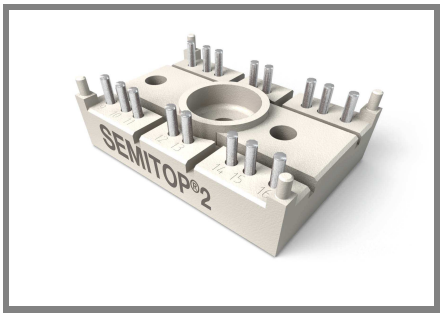
# SK75GAL12T4




**SEMITOP® 2**

## IGBT Module

**SK75GAL12T4**

**SK75GAR12T4**

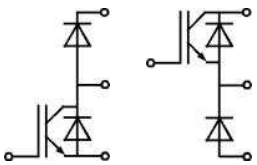
### Features

- One screw mounting module
- Trench4 IGBT technology
- CAL4 technology FWD

### Typical Applications*

### Remarks

- $V_{CE,sat}$ , $V_F$ = chip level value



**GAL** **GAR**

| **Absolute Maximum Ratings** | | | $T_s$ = 25 °C, unless otherwise specified | |
|---|---|---|---|---|
| **Symbol** | **Conditions** | | **Values** | **Units** |
| **IGBT** | | | | |
| $V_{CES}$ | $T_j$ = 25 °C | | 1200 | V |
| $I_C$ | $T_j$ = 175 °C | $T_s$ = 25 °C | 80 | A |
| | | $T_s$ = 70 °C | 65 | A |
| $I_{CRM}$ | $I_{CRM}$= 3 x $I_{Cnom}$ | | 225 | A |
| $V_{GES}$ | | | ± 20 | V |
| $t_{psc}$ | $V_{CC}$ = 800 V; $V_{GE} \leq$ 15 V; $V_{CES}$ < 1200 V | $T_j$ = 150 °C | 10 | µs |
| **Inverse Diode** | | | | |
| $I_F$ | $T_j$ = 175 °C | $T_s$ = 25 °C | 20 | A |
| | | $T_s$ = 70 °C | 16 | A |
| $I_{FRM}$ | $I_{FRM}$= 3 x $I_{Fnom}$ | | 45 | A |
| $I_{FSM}$ | $t_p$ = 10 ms; half sine wave | $T_j$ = 150 °C | 90 | A |
| **Freewheeling Diode** | | | | |
| $I_F$ | $T_j$ = 175 °C | $T_S$ = 25 °C | 70 | A |
| | | $T_S$ = 70 °C | 55 | A |
| $I_{FRM}$ | $I_{FRM}$ = 3x$I_{Fnom}$ | | 225 | A |
| $I_{FSM}$ | $t_p$ = 10 ms; half sine wave | $T_j$ = 150 °C | 425 | A |
| **Module** | | | | |
| $I_{t(RMS)}$ | | | | A |
| $T_{vj}$ | | | -40 ... +175 | °C |
| $T_{stg}$ | | | -40 ... +125 | °C |
| $V_{isol}$ | AC, 1 min. | | 2500 | V |

| **Characteristics** | | | $T_s$ = 25 °C, unless otherwise specified | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Conditions** | | **min.** | **typ.** | **max.** | **Units** |
| **IGBT** | | | | | | |
| $V_{GE(th)}$ | $V_{GE}$ = $V_{CE}$, $I_C$ = 3 mA | | 5 | 5,8 | 6,5 | V |
| $I_{CES}$ | $V_{GE}$ = 0 V, $V_{CE}$ = $V_{CES}$ | $T_j$ = 25 °C | | | 1,0 | mA |
| | | $T_j$ = 150 °C | | | | mA |
| $I_{GES}$ | $V_{CE}$ = 0 V, $V_{GE}$ = 20 V | $T_j$ = 25 °C | | | 600 | nA |
| | | $T_j$ = 150 °C | | | | nA |
| $V_{CE0}$ | | $T_j$ = 25 °C | | 1,1 | 1,3 | V |
| | | $T_j$ = 150 °C | | 1 | 1,2 | V |
| $r_{CE}$ | $V_{GE}$ = 15 V | $T_j$ = 25°C | | 10 | | mΩ |
| | | $T_j$ = 150°C | | 16 | | mΩ |
| $V_{CE(sat)}$ | $I_{Cnom}$ = 75 A, $V_{GE}$ = 15 V | $T_j$ = 25°C$_{chiplev.}$ | | 1,85 | 2,05 | V |
| | | $T_j$ = 150°C$_{chiplev.}$ | | 2,25 | 2,45 | V |
| $C_{ies}$ | $V_{CE}$ = 25, $V_{GE}$ = 0 V | f = 1 MHz | | 4,4 | | nF |
| $C_{oes}$ | | | | 0,29 | | nF |
| $C_{res}$ | | | | 0,235 | | nF |
| $Q_G$ | $V_{GE}$=-7V...+15V | | | 570 | | nC |
| $R_{Gint}$ | $T_j$ = 25 °C | | | 10 | | Ω |
| $t_{d(on)}$ | $R_{Gon}$ = 15 Ω<br>di/dt = 2000 A/µs | $V_{CC}$ = 600V<br>$I_C$= 75A<br>$T_j$ = 150 °C<br>$V_{GE}$= -7/+15V | | 50 | | ns |
| $t_r$ | | | | 60 | | ns |
| $E_{on}$ | | | | 13 | | mJ |
| $t_{d(off)}$ | $R_{Goff}$ = 15 Ω | | | 500 | | ns |
| $t_f$ | | | | 60 | | ns |
| $E_{off}$ | | | | 7 | | mJ |
| $R_{th(j-s)}$ | per IGBT | | | 0,74 | | K/W |

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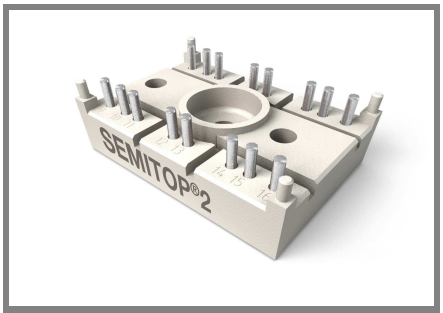


**SEMITOP® 2**

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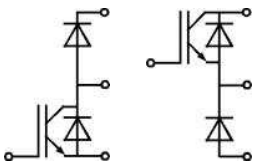
### Remarks

- $V_{CE,sat}$ , $V_F$ = chip level value



**GAL** **GAR**

| Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Conditions** | | **min.** | **typ.** | **max.** | **Units** |
| **Inverse Diode** | | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom}$ = 15 A; $V_{GE}$ = 0 V | $T_j$ = 25 °$C_{chiplev.}$ | | 2,38 | 2,71 | V |
| | | $T_j$ = 150 °$C_{chiplev.}$ | | 2,44 | 2,77 | V |
| $V_{F0}$ | | $T_j$ = 25 °C | | 1,3 | 1,5 | V |
| | | $T_j$ = 150 °C | | 0,9 | 1,1 | V |
| $r_F$ | | $T_j$ = 25 °C | | 72 | 80,7 | mΩ |
| | | $T_j$ = 150 °C | | 102,8 | 111,6 | mΩ |
| $I_{RRM}$ | $I_F$ = A | $T_j$ = 150 °C | | | | A |
| $Q_{rr}$ | | | | | | µC |
| $E_{rr}$ | $V_{CC}$= 600V | | | | | mJ |
| $R_{th(j-s)D}$ | per diode | | | 2,34 | | K/W |
| **Freewheeling Diode** | | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom}$ = 75 A; $V_{GE}$ = 0 V | $T_j$ = 25 °$C_{chiplev.}$ | | 2,1 | 2,5 | V |
| | | $T_j$ = 150 °$C_{chiplev.}$ | | 2,4 | 2,5 | V |
| $V_{F0}$ | | $T_j$ = 25 °C | | 1,3 | 1,5 | V |
| | | $T_j$ = 150 °C | | 0,9 | 1,1 | V |
| $r_F$ | | $T_j$ = 25 °C | | 12 | 13,3 | V |
| | | $T_j$ = 150 °C | | 16 | 17,3 | V |
| $I_{RRM}$ | $I_F$ = 75 A | $T_j$ = 150 °C | | 45 | | A |
| $Q_{rr}$ | di/dt = 2000 A/µs | | | 10 | | µC |
| $E_{rr}$ | $V_{CC}$ = 600V | | | 3 | | mJ |
| $R_{th(j-s)FD}$ | per diode | | | 0,97 | | K/W |
| $M_s$ | to heat sink | | | | 2,5 | Nm |
| w | | | | 30 | | g |
| **Temperature sensor** | | | | | | |
| $R_{100}$ | $T_s$=100°C ($R_{25}$=5kΩ) | | | 493±5% | | Ω |

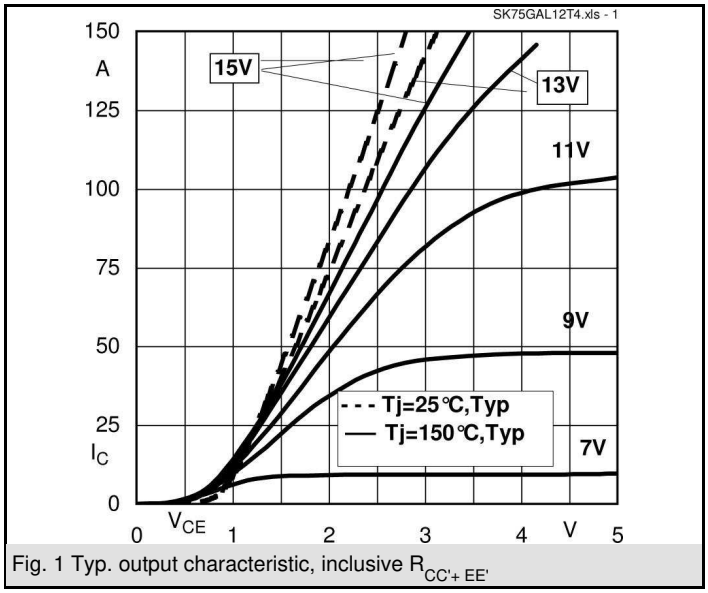



Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

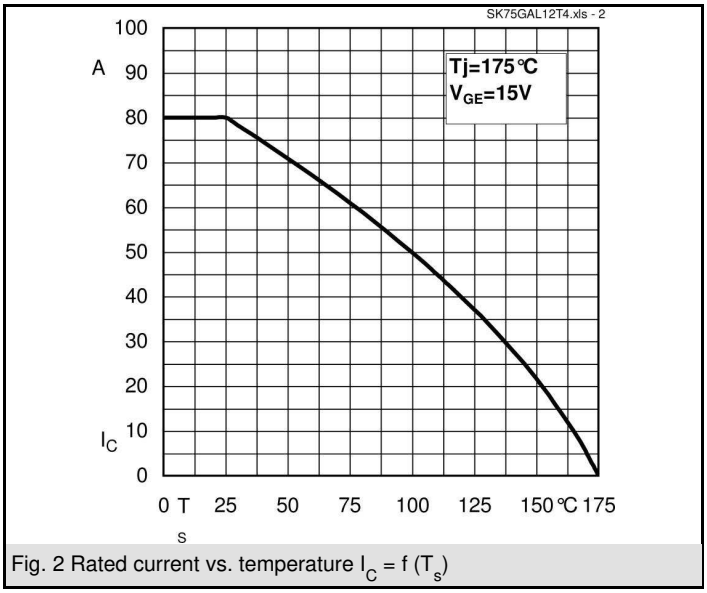



Fig. 2 Rated current vs. temperature $I_C = f(T_s)$

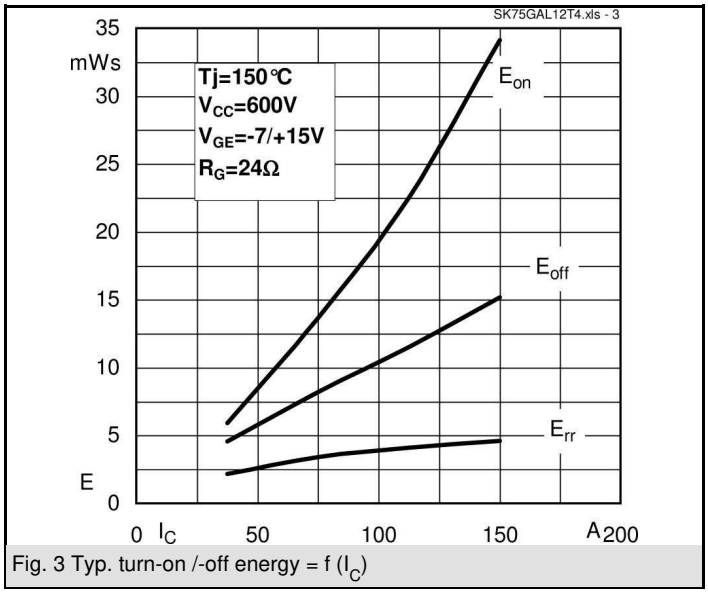



Fig. 3 Typ. turn-on /-off energy = f ($I_C$)

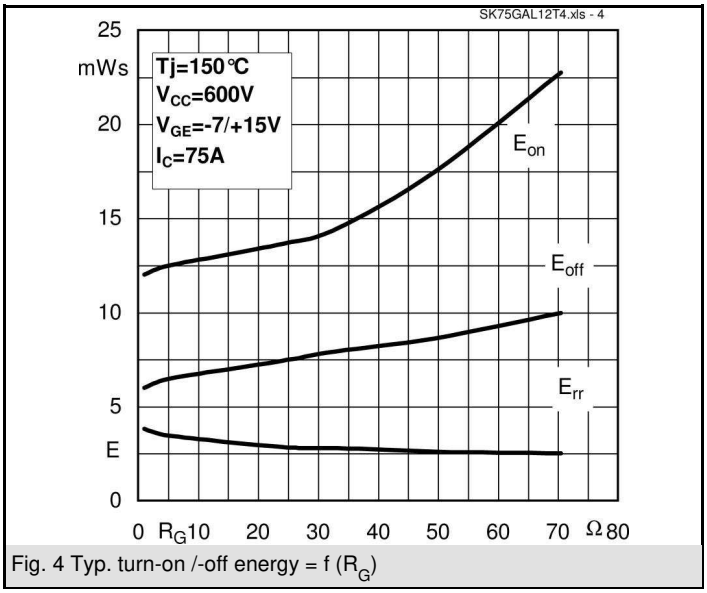



Fig. 4 Typ. turn-on /-off energy = f ($R_G$)

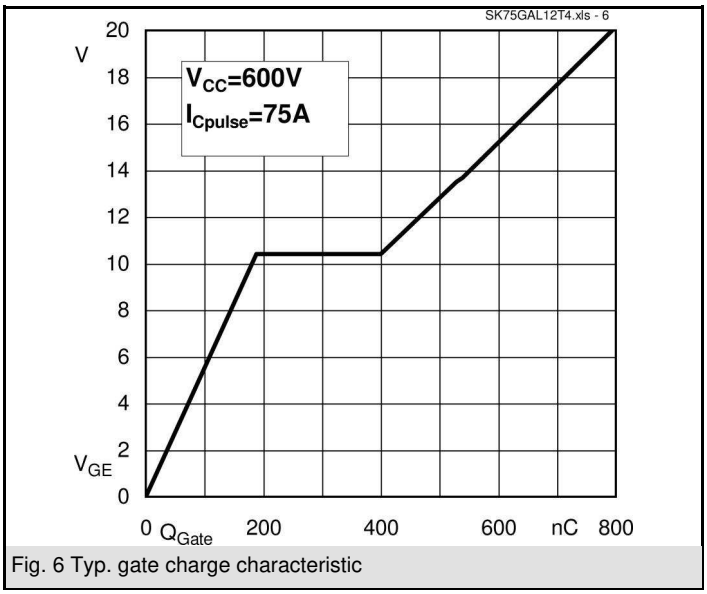



Fig. 6 Typ. gate charge characteristic

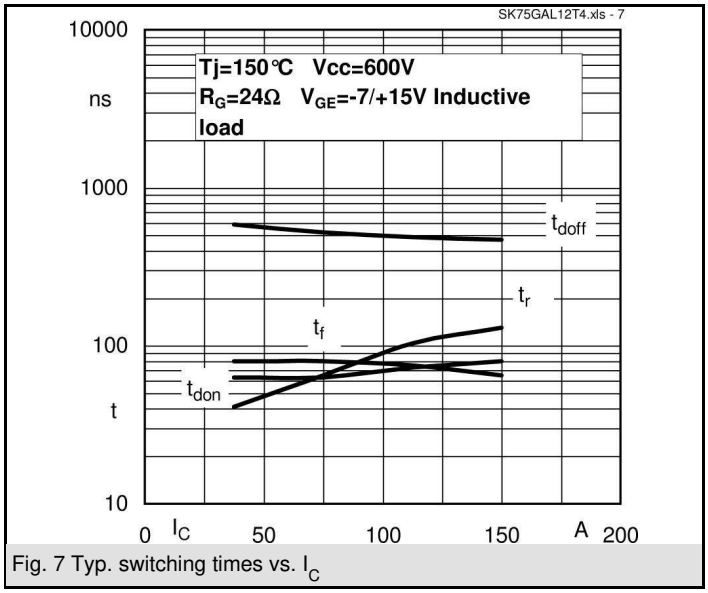



Fig. 7 Typ. switching times vs. $I_C$

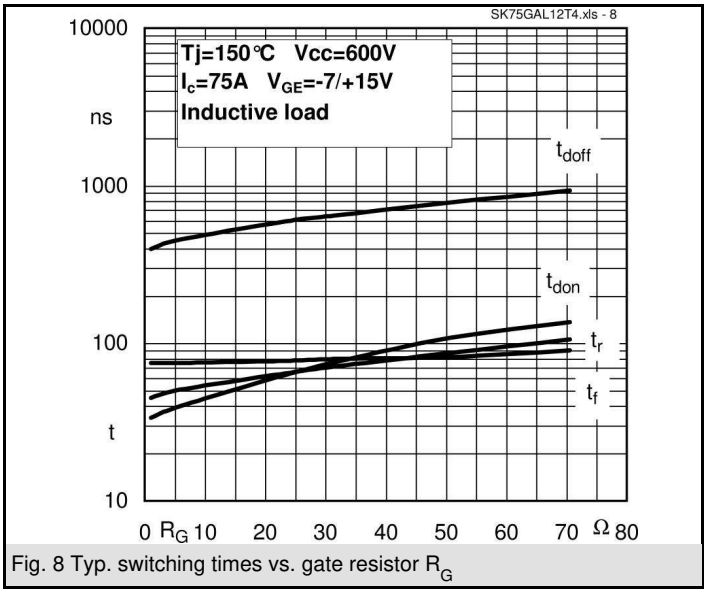



Fig. 8 Typ. switching times vs. gate resistor $R_G$

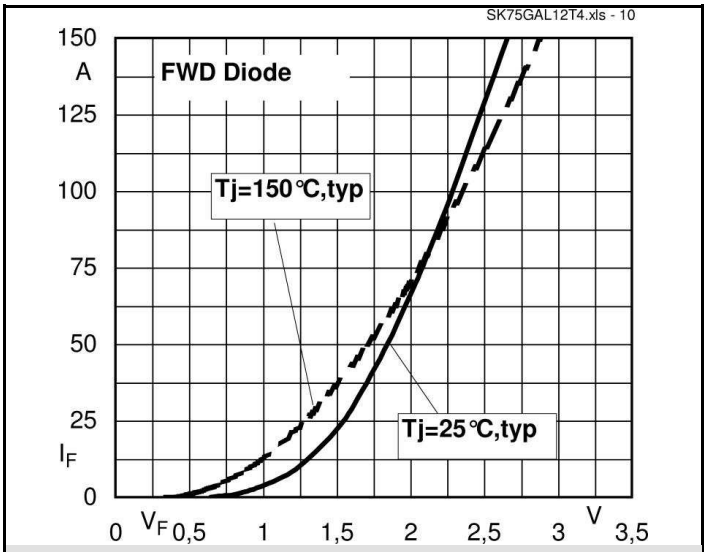
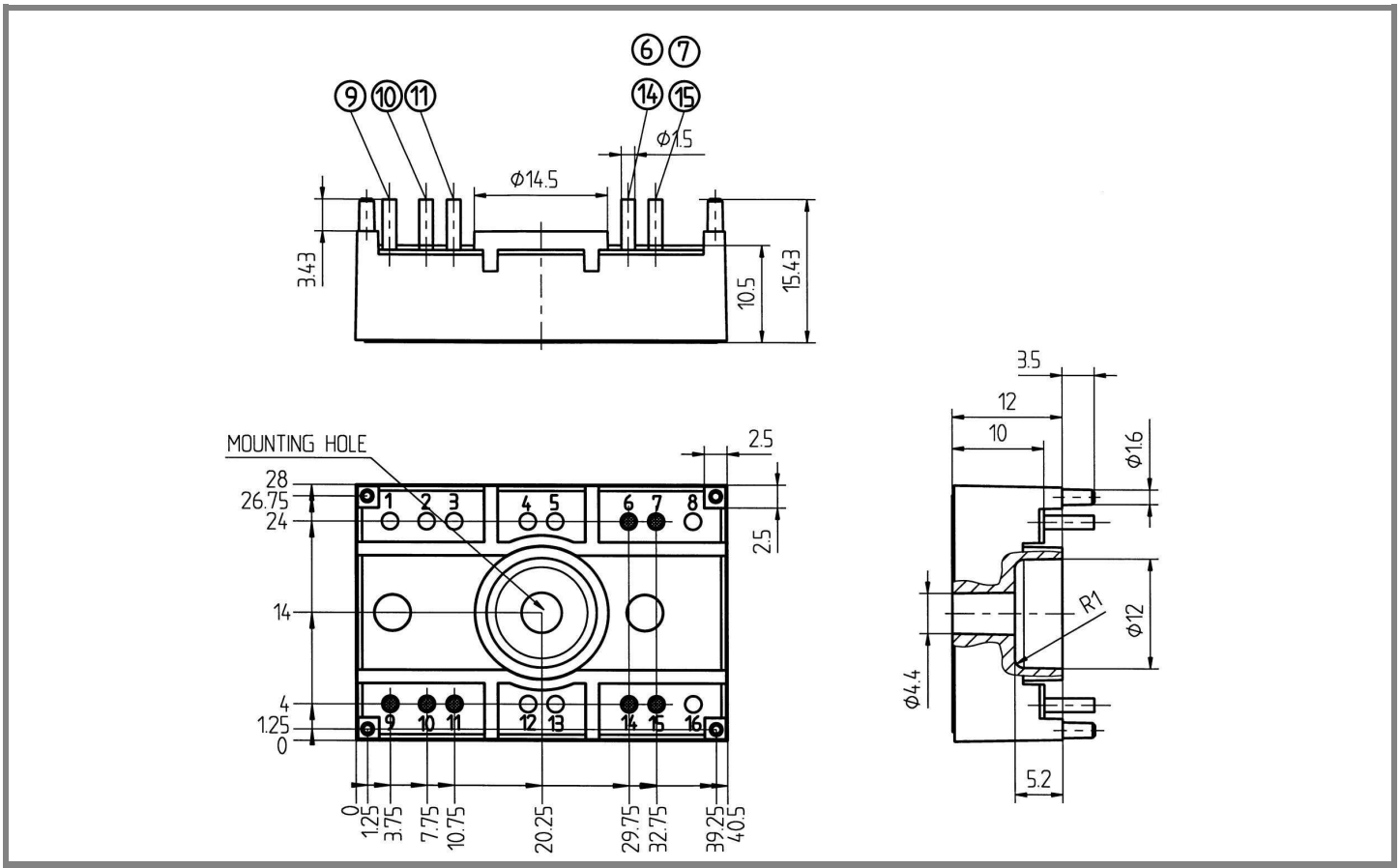
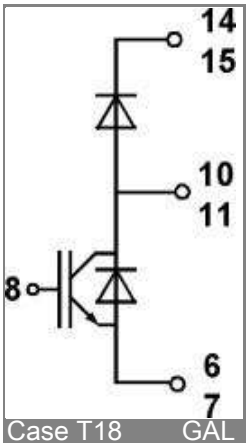



Fig. 10 CAL diode forward characteristic

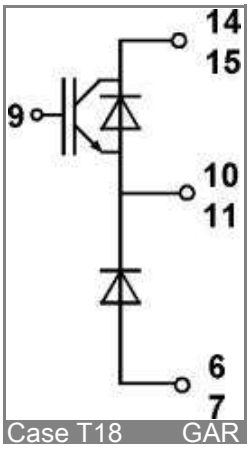
 




Case T18 (Suggested hole diameter for the solder pins and mounting plastic pins: 2mm)




Case T18 GAL




Case T18 GAR

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

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