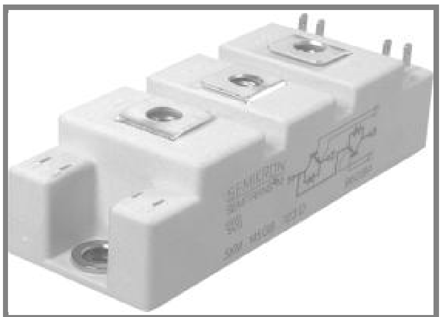
# SKM 100GB124D



SEMITRANS™ 2

## Low Loss IGBT Module

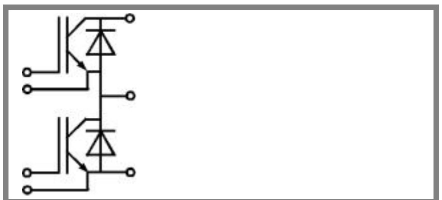
**SKM 100GB124D**

### Features

- MOS input (voltage controlled)
- N channel, homogeneous Silicon structure (NPT- Non punch-through IGBT)
- Low loss high density chip
- Low tail current
- 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 Technology without hard mould
- Large clearance (10 mm) and creepage distances (20 mm)

### Typical Applications

- Switching (not for linear use)



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| Absolute Maximum Ratings | | $T_c$ = 25 °C, unless otherwise specified | |
|---|---|---|---|
| **Symbol** | **Conditions** | **Values** | **Units** |
| **IGBT** | | | |
| $V_{CES}$ | | 1200 | V |
| $I_C$ | $T_c$ = 25 (85) °C | 150 (100) | A |
| $I_{CRM}$ | $t_p$ = 1 ms | 150 | A |
| $V_{GES}$ | | ± 20 | V |
| $T_{vj}$, ($T_{stg}$) | $T_{OPERATION} \leq T_{stg}$ | - 40 ... + 150 (125) | °C |
| $V_{isol}$ | AC, 1 min. | 2500 | V |
| **Inverse diode** | | | |
| $I_F$ | $T_c$ = 25 (80) °C | 95 (65) | A |
| $I_{FRM}$ | $t_p$ = 1 ms | 150 | 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** | | | | | |
| $V_{GE(th)}$ | $V_{GE} = V_{CE}$, $I_C$ = 2 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 | | 1,1 (1,1) | 1,25 (1,25) | V |
| $r_{CE}$ | $V_{GE}$ = 15 V, $T_j$ = 25 (125) °C | | 13,3 (17,3) | 16 (21,3) | mΩ |
| $V_{CE(sat)}$ | $I_{Cnom}$ = 75 A, $V_{GE}$ = 15 V, chip level | | 2,1 (2,4) | 2,45 (2,85) | V |
| $C_{ies}$ | under following conditions | | 5 | 6,6 | nF |
| $C_{oes}$ | $V_{GE}$ = 0, $V_{CE}$ = 25 V, f = 1 MHz | | 0,72 | 0,9 | nF |
| $C_{res}$ | | | 0,38 | 0,5 | nF |
| $L_{CE}$ | | | | 30 | nH |
| $R_{CC'+EE'}$ | res., terminal-chip $T_c$= 25 (125) °C | | 0,75 (1) | | mΩ |
| $t_{d(on)}$ | $V_{CC}$ = 600 V, $I_{Cnom}$ = 75 A | | 80 | | ns |
| $t_r$ | $R_{Gon} = R_{Goff}$ = 10 Ω, $T_j$ = 125 °C | | 45 | | ns |
| $t_{d(off)}$ | $V_{GE}$ = ± 15 V | | 430 | | ns |
| $t_f$ | | | 55 | | ns |
| $E_{on}$ ($E_{off}$) | | | 11 (9) | | mJ |
| **Inverse diode** | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom}$ = 75 A; $V_{GE}$ = 0 V; $T_j$ = 25 (125) °C | | 2 (1,8) | 2,5 | V |
| $V_{(TO)}$ | $T_j$ = 125 () °C | | 1,1 | 1,2 | V |
| $r_T$ | $T_j$ = 125 () °C | | | 15 | mΩ |
| $I_{RRM}$ | $I_{Fnom}$ = 75 A; $T_j$ = 125 ( ) °C | | 42 | | A |
| $Q_{rr}$ | di/dt = 800 A/µs | | 9,1 | | µC |
| $E_{rr}$ | $V_{GE}$ = V | | | | mJ |
| **Thermal characteristics** | | | | | |
| $R_{th(j-c)}$ | per IGBT | | | 0,18 | K/W |
| $R_{th(j-c)D}$ | per Inverse Diode | | | 0,5 | 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 |

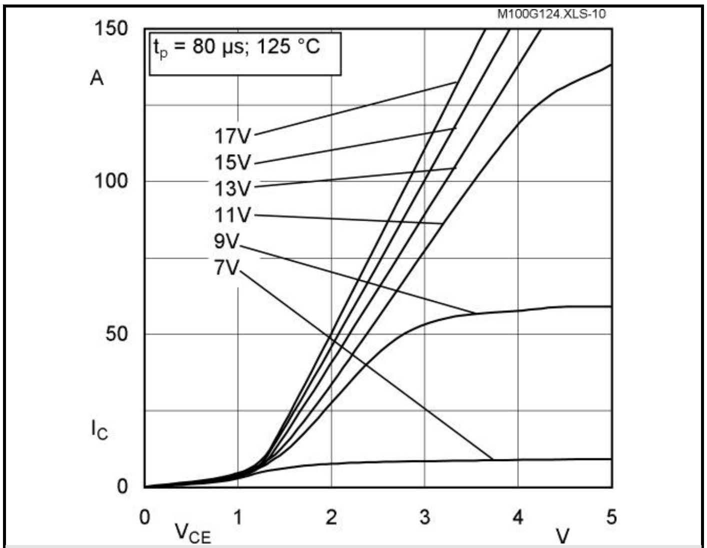



Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

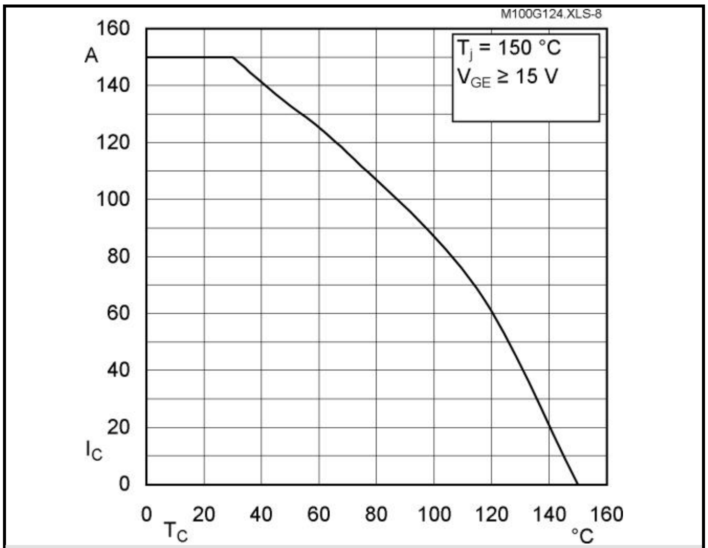



Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

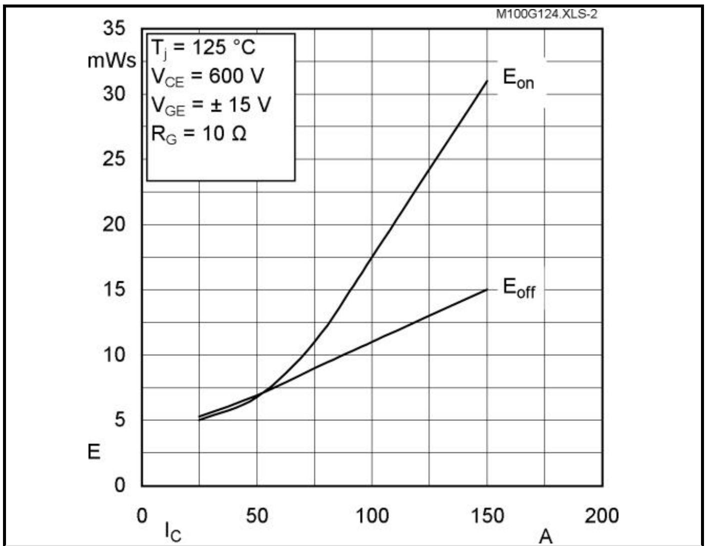



Fig. 3 Typ. turn-on /-off energy = f ($I_C$)

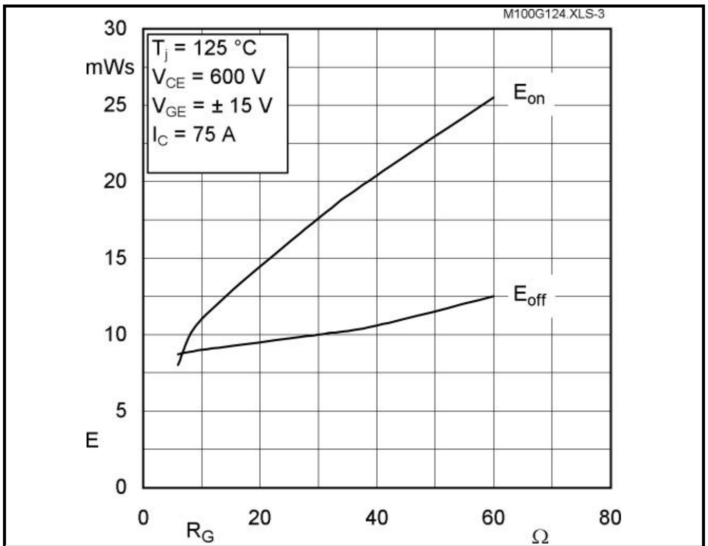



Fig. 4 Typ. turn-on /-off energy = f ($R_G$)

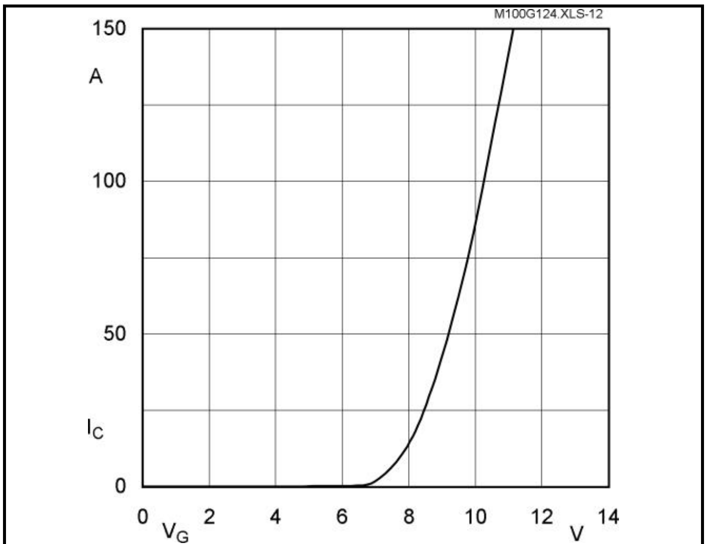



Fig. 5 Typ. transfer characteristic

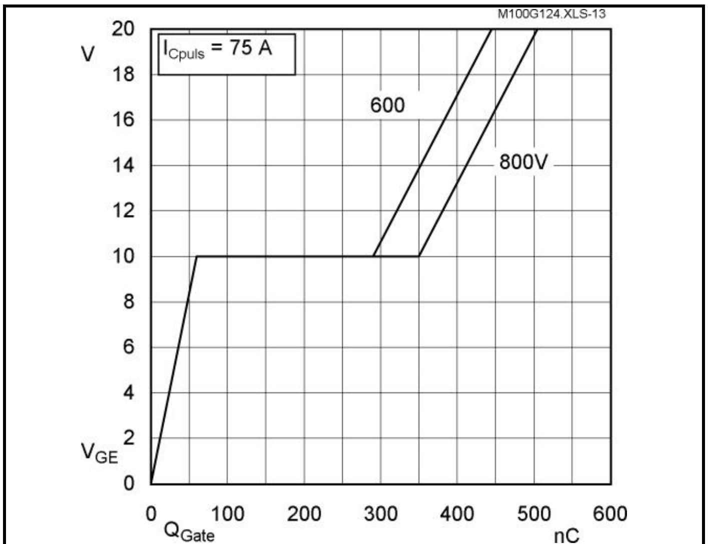



Fig. 6 Typ. gate charge characteristic

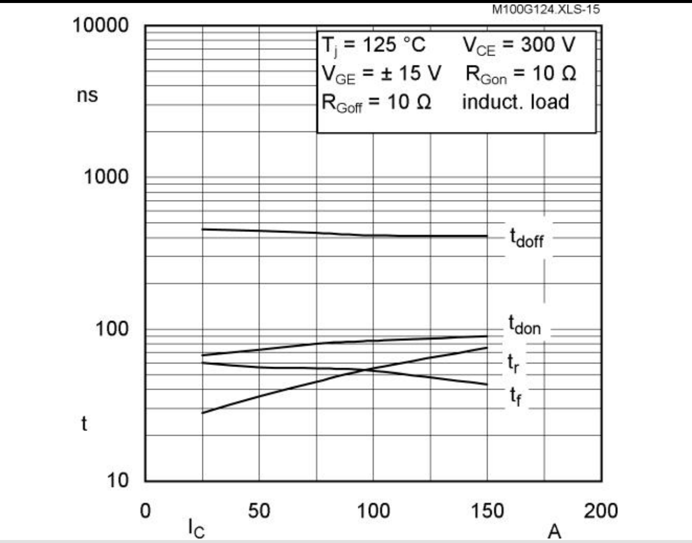



Fig. 7 Typ. switching times vs. $I_C$

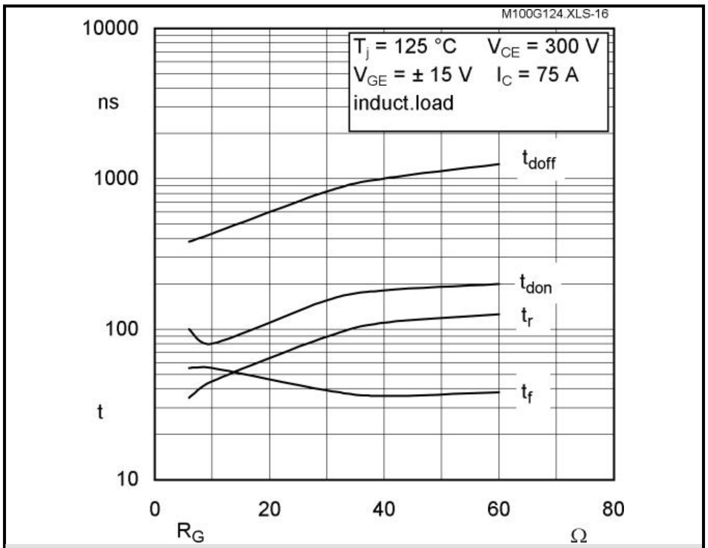



Fig. 8 Typ. switching times vs. gate resistor $R_G$

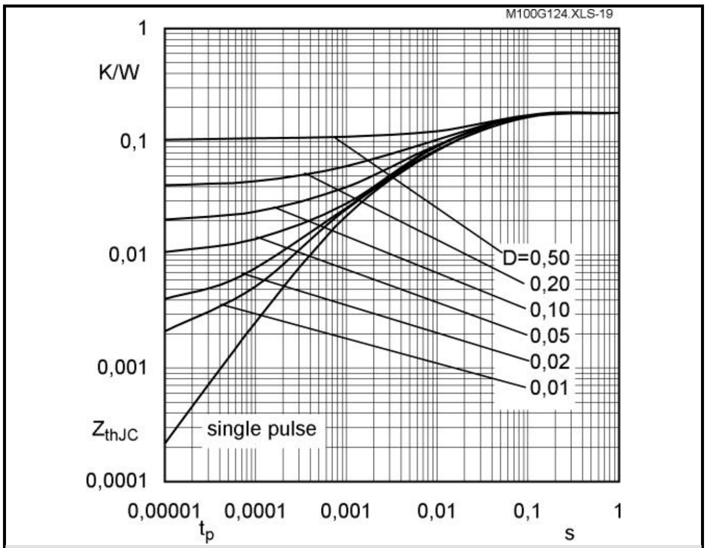



Fig. 9 Transient thermal impedance of IGBT

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

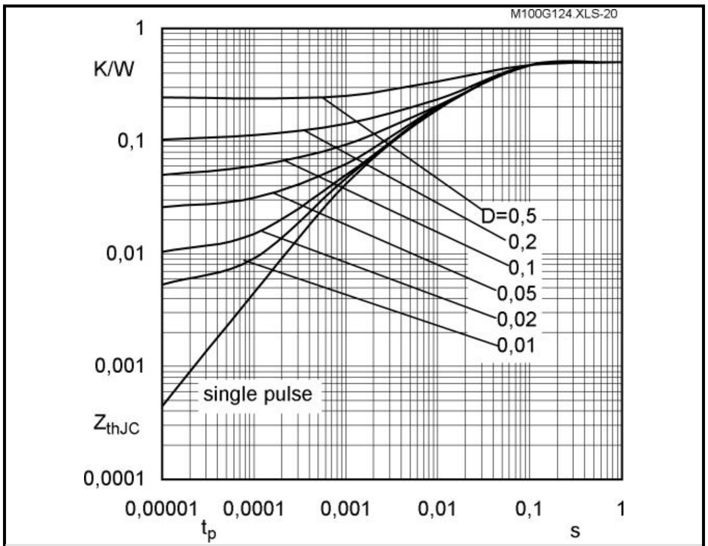



Fig. 10 Transient thermal impedance of FWD

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

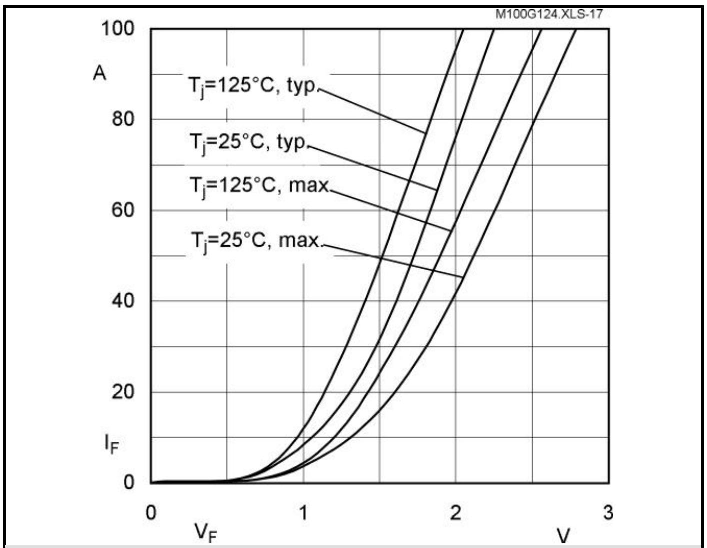



Fig. 11 CAL diode forward characteristic

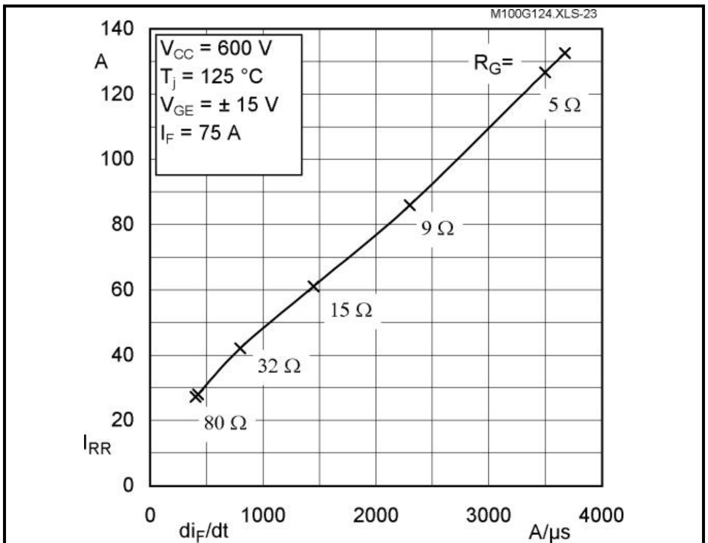



Fig. 12 Typ. CAL diode peak reverse recovery current

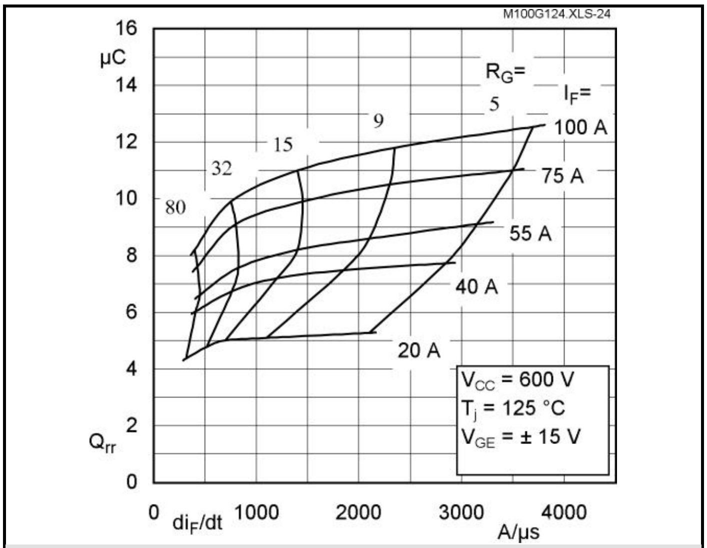
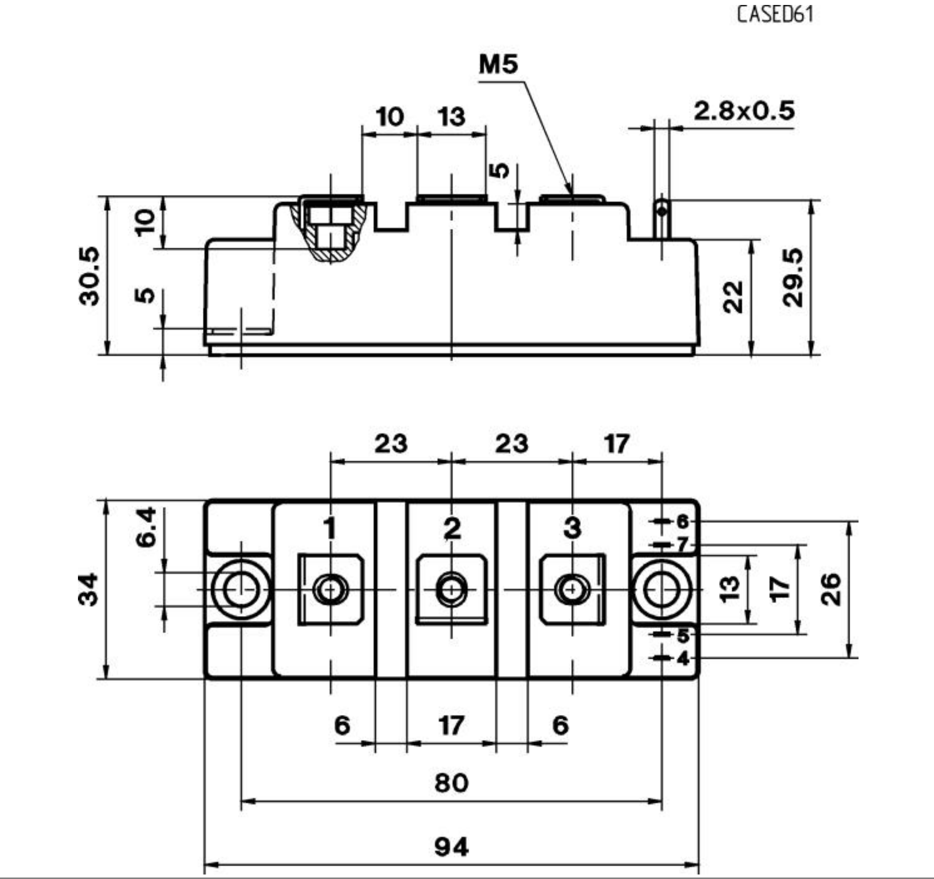
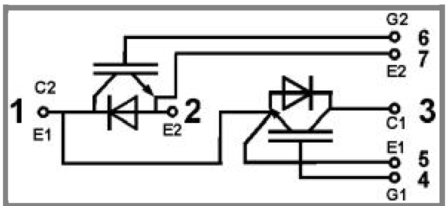



Fig. 13 Typ. CAL diode recovered charge




Case D 61




GB Case D 61

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

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