



SEMITRANS®3

IGBT4 Modules

SKM200GB12E4

Features

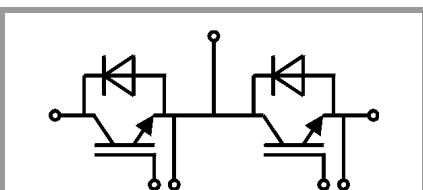
- IGBT4 = 4. Generation (Trench)IGBT
- VCEsat with positive temperature coefficient
- High short circuit capability, self limiting to 6 x I_{CNOM}
- Soft switching 4. Generation CAL diode (CAL4)

Typical Applications

- AC inverter drives
- UPS
- Electronic welders at fsw up to 20 kHz

Remarks

- Case temperature limited to T_c = 125°C max, recomm. T_{op} = -40 ... +150°C, product rel. results valid for T_j = 150°



GB

| Absolute Maximum Ratings | | | | |
|--------------------------|--|-------------------------|------|----|
| Symbol | Conditions | Values | Unit | |
| IGBT | | | | |
| V _{CES} | | 1200 | V | |
| I _C | T _j = 175 °C | T _c = 25 °C | 314 | A |
| | | T _c = 80 °C | 242 | A |
| I _{Cnom} | | 200 | A | |
| I _{CRM} | I _{CRM} = 3xI _{Cnom} | 600 | A | |
| V _{GES} | | -20 ... 20 | V | |
| t _{psc} | V _{CC} = 800 V | T _j = 150 °C | 10 | µs |
| | V _{GE} ≤ 15 V | | | |
| | V _{CES} ≤ 1200 V | | | |
| T _j | | -40 ... 175 | | °C |
| Inverse diode | | | | |
| I _F | T _j = 175 °C | T _c = 25 °C | 229 | A |
| | | T _c = 80 °C | 172 | A |
| I _{Fnom} | | 200 | A | |
| I _{FRM} | I _{FRM} = 3xI _{Fnom} | 600 | A | |
| I _{FSM} | t _p = 10 ms, sin 180°, T _j = 25 °C | 990 | A | |
| T _j | | -40 ... 175 | | °C |
| Module | | | | |
| I _{t(RMS)} | | 500 | | A |
| T _{stg} | | -40 ... 125 | | °C |
| V _{isol} | AC sinus 50Hz, t = 1 min | 4000 | | V |

| Characteristics | | | | | |
|----------------------|--|-------------------------|------|------|------|
| Symbol | Conditions | min. | typ. | max. | Unit |
| IGBT | | | | | |
| V _{CE(sat)} | I _C = 200 A V _{GE} = 15 V chipelevel | T _j = 25 °C | 1.8 | 2.05 | V |
| | | T _j = 150 °C | 2.2 | 2.4 | V |
| V _{CE0} | | T _j = 25 °C | 0.8 | 0.9 | V |
| | | T _j = 150 °C | 0.7 | 0.8 | V |
| r _{CE} | V _{GE} = 15 V | T _j = 25 °C | 5.0 | 5.8 | mΩ |
| | | T _j = 150 °C | 7.5 | 8.0 | mΩ |
| V _{GE(th)} | V _{GE} =V _{CE} , I _C = 7.6 mA | 5 | 5.8 | 6.5 | V |
| I _{CES} | V _{GE} = 0 V V _{CE} = 1200 V | T _j = 25 °C | 0.1 | 0.3 | mA |
| | | T _j = 150 °C | | | mA |
| C _{ies} | V _{CE} = 25 V | f = 1 MHz | 12.3 | | nF |
| C _{oes} | V _{GE} = 0 V | f = 1 MHz | 0.81 | | nF |
| C _{res} | | f = 1 MHz | 0.69 | | nF |
| Q _G | V _{GE} = - 8 V...+ 15 V | | 1130 | | nC |
| R _{Gint} | T _j = 25 °C | | 3.8 | | Ω |
| t _{d(on)} | V _{CC} = 600 V | T _j = 150 °C | 204 | | ns |
| t _r | I _C = 200 A V _{GE} = ±15 V | T _j = 150 °C | 40 | | ns |
| | | | | | |
| E _{on} | R _{G on} = 1 Ω | T _j = 150 °C | 21 | | mJ |
| t _{d(off)} | R _{G off} = 1 Ω | T _j = 150 °C | 490 | | ns |
| t _f | di/dt _{on} = 5500 A/µs | T _j = 150 °C | 107 | | ns |
| E _{off} | di/dt _{off} = 2300 A/µs | T _j = 150 °C | 27 | | mJ |
| R _{th(j-c)} | per IGBT | | | 0.14 | K/W |



SEMITRANS®3

IGBT4 Modules

SKM200GB12E4

Features

- IGBT4 = 4. Generation (Trench)IGBT
- VCEsat with positive temperature coefficient
- High short circuit capability, self limiting to $6 \times I_{CNOM}$
- Soft switching 4. Generation CAL diode (CAL4)

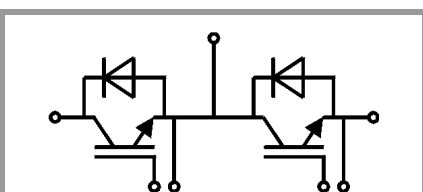
Typical Applications

- AC inverter drives
- UPS
- Electronic welders at fsw up to 20 kHz

Remarks

- Case temperature limited to $T_c = 125^\circ\text{C}$ max, recomm.
 $T_{op} = -40 \dots +150^\circ\text{C}$, product rel. results valid for $T_j = 150^\circ$

| Characteristics | | | | | | |
|----------------------|---|---------------------------|------|------|-------|---------------|
| Symbol | Conditions | | min. | typ. | max. | Unit |
| Inverse diode | | | | | | |
| $V_F = V_{EC}$ | $I_F = 200 \text{ A}$ $V_{GE} = 0 \text{ V}$ chip | $T_j = 25^\circ\text{C}$ | | 2.2 | 2.52 | V |
| | | $T_j = 150^\circ\text{C}$ | | 2.15 | 2.47 | V |
| V_{F0} | | $T_j = 25^\circ\text{C}$ | | 1.3 | 1.5 | V |
| | | $T_j = 150^\circ\text{C}$ | | 0.9 | 1.1 | V |
| r_F | | $T_j = 25^\circ\text{C}$ | | 4.5 | 5.1 | m Ω |
| | | $T_j = 150^\circ\text{C}$ | | 6.3 | 6.8 | m Ω |
| I_{RRM} | $I_F = 200 \text{ A}$ | $T_j = 150^\circ\text{C}$ | | 174 | | A |
| Q_{rr} | $di/dt_{off} = 4450 \text{ A}/\mu\text{s}$ | $T_j = 150^\circ\text{C}$ | | 33 | | μC |
| E_{rr} | $V_{GE} = \pm 15 \text{ V}$ $V_{CC} = 600 \text{ V}$ | $T_j = 150^\circ\text{C}$ | | 13 | | mJ |
| $R_{th(j-c)}$ | per diode | | | | 0.26 | K/W |
| Module | | | | | | |
| L_{CE} | | | | 15 | 20 | nH |
| $R_{CC'+EE'}$ | terminal-chip | $T_c = 25^\circ\text{C}$ | | 0.25 | | m Ω |
| | | $T_c = 125^\circ\text{C}$ | | 0.5 | | m Ω |
| $R_{th(c-s)}$ | per module | | | 0.02 | 0.038 | K/W |
| M_s | to heat sink M6 | | | 3 | 5 | Nm |
| M_t | | to terminals M6 | | 2.5 | 5 | Nm |
| | | | | | | Nm |
| w | | | | | 325 | g |



GB

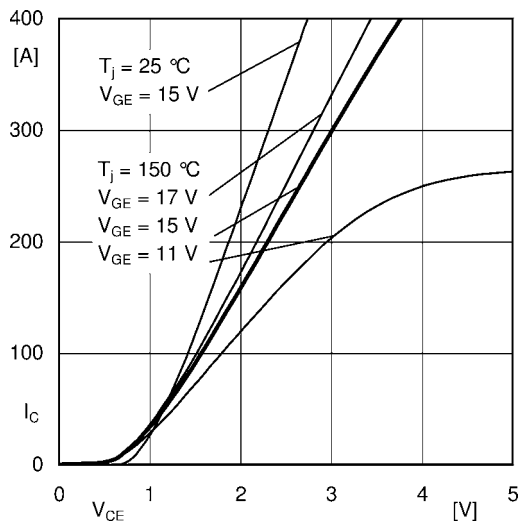


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

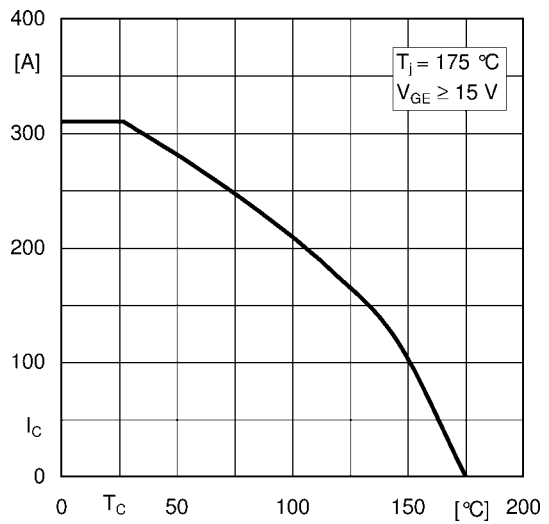


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

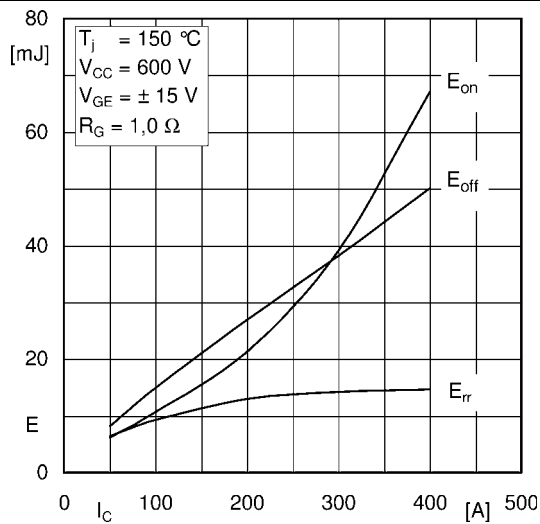


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

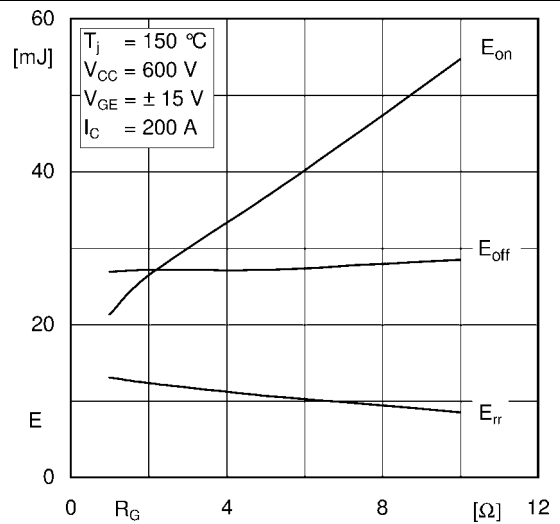


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

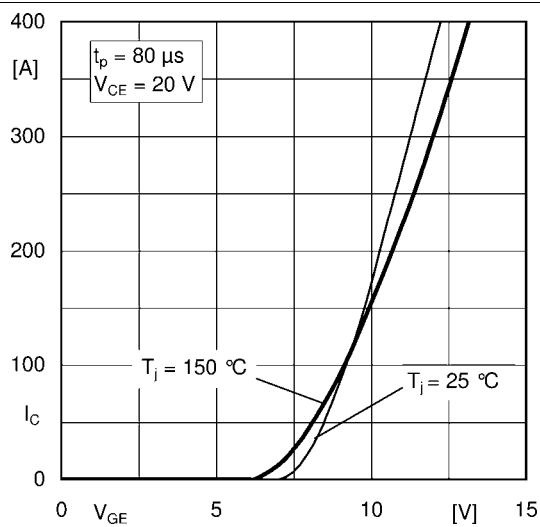


Fig. 5: Typ. transfer characteristic

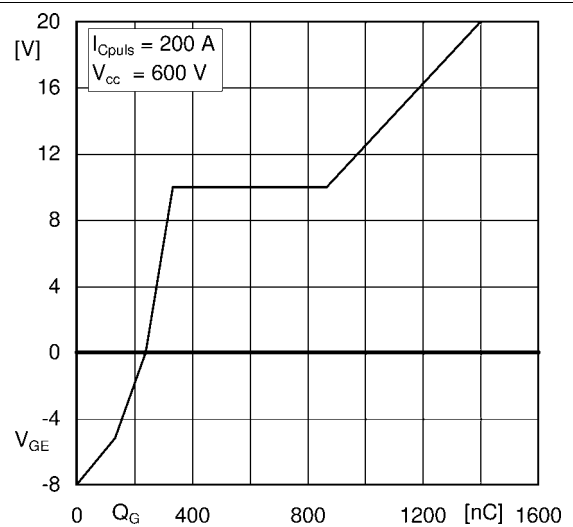


Fig. 6: Typ. gate charge characteristic

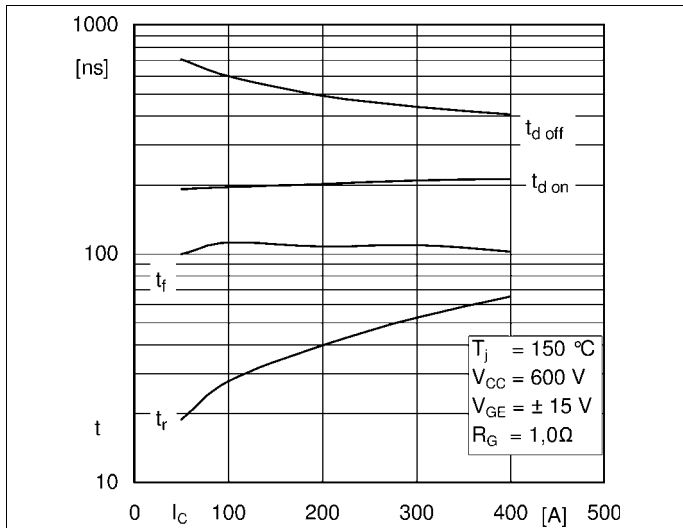


Fig. 7: Typ. switching times vs. I_C

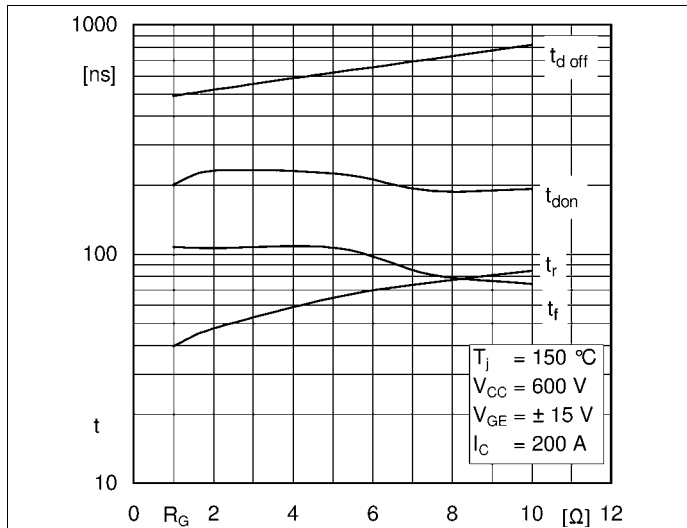


Fig. 8: Typ. switching times vs. gate resistor R_G

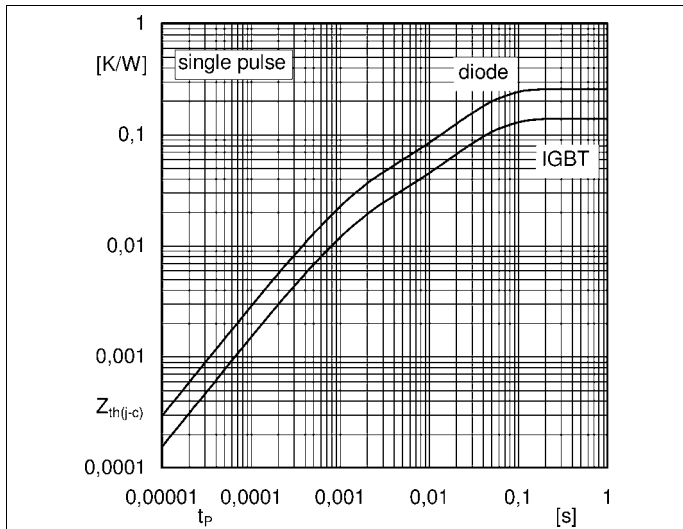


Fig. 9: Transient thermal impedance

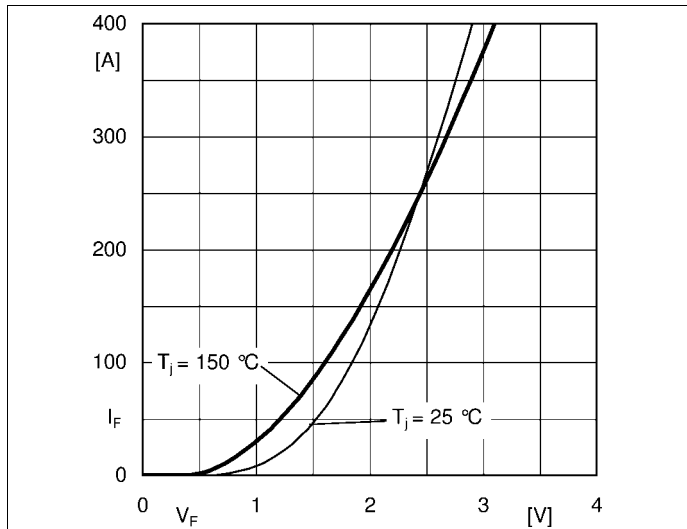


Fig. 10: CAL diode forward characteristic

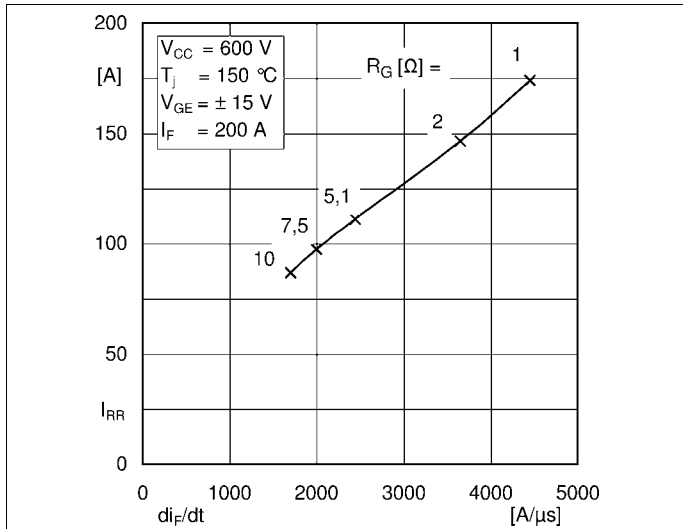


Fig. 11: CAL diode peak reverse recovery current

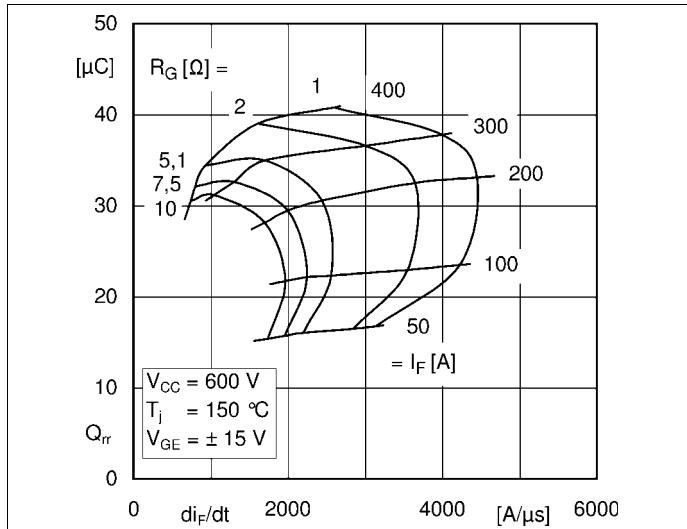
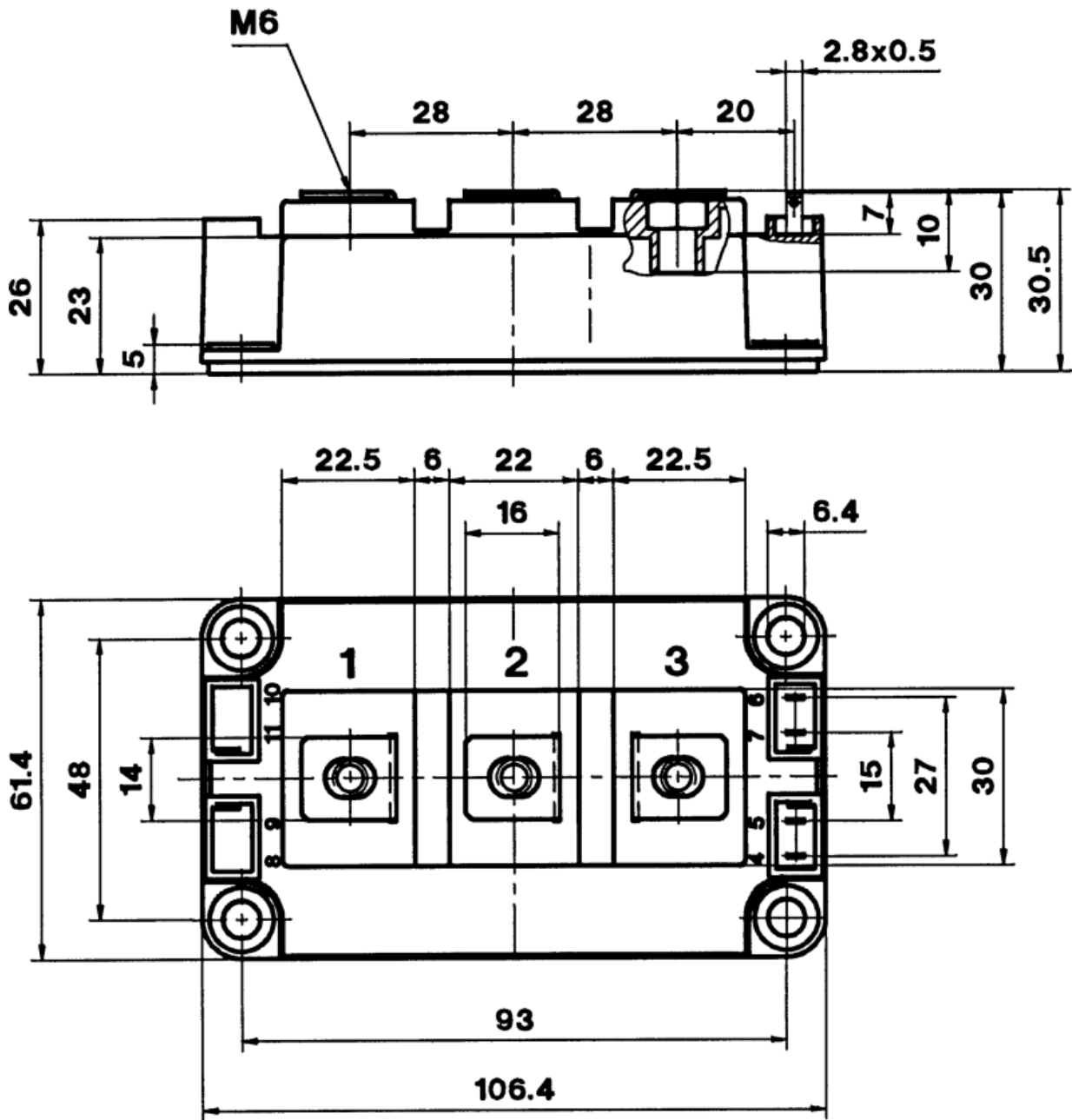
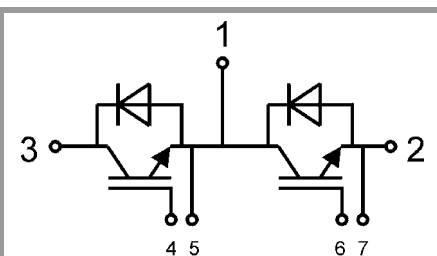


Fig. 12: Typ. CAL diode peak reverse recovery charge



Semitrans 3



GB

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.