

SKM75GB12T4



SEMITRANS® 2

Fast IGBT4 Modules

SKM75GB12T4

Features

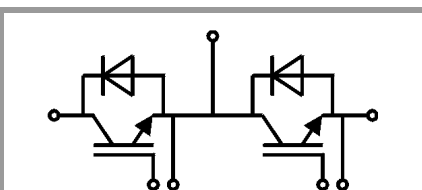
- IGBT4 = 4. generation fast trench IGBT (Infineon)
- CAL4 = Soft switching 4. generation CAL-diode
- Insulated copper baseplate using DBC technology (Direct Bonded Copper)
- Increased power cycling capability
- With integrated gate resistor
- For higher switching frequencies up to 20kHz
- UL recognized, file no. E63532

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.
- Recommended $T_{op} = -40 \dots +150^\circ\text{C}$
- Product reliability results valid for $T_j = 150^\circ\text{C}$



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Absolute Maximum Ratings

| Symbol | Conditions | Values | Unit | |
|----------------------|--|---------------------------|------------------|---------------|
| IGBT | | | | |
| V_{CES} | $T_j = 25^\circ\text{C}$ | 1200 | V | |
| I_C | $T_j = 175^\circ\text{C}$ | $T_c = 25^\circ\text{C}$ | 115 | A |
| | | $T_c = 80^\circ\text{C}$ | 88 | A |
| I_{Cnom} | | 75 | A | |
| I_{CRM} | $I_{CRM} = 3 \times I_{Cnom}$ | 225 | A | |
| V_{GES} | | -20 ... 20 | V | |
| t_{psc} | $V_{CC} = 800\text{ V}$ | $T_j = 150^\circ\text{C}$ | 10 | μs |
| | $V_{GE} \leq 15\text{ V}$ | | | |
| | $V_{CES} \leq 1200\text{ V}$ | | | |
| T_j | | -40 ... 175 | $^\circ\text{C}$ | |
| Inverse diode | | | | |
| I_F | $T_j = 175^\circ\text{C}$ | $T_c = 25^\circ\text{C}$ | 97 | A |
| | | $T_c = 80^\circ\text{C}$ | 73 | A |
| I_{Fnom} | | 75 | A | |
| I_{FRM} | $I_{FRM} = 2 \times I_{Fnom}$ | 150 | A | |
| I_{FSM} | $t_p = 10\text{ ms, sin } 180^\circ, T_j = 25^\circ\text{C}$ | 430 | A | |
| T_j | | -40 ... 175 | $^\circ\text{C}$ | |
| Module | | | | |
| $I_{t(RMS)}$ | | 200 | A | |
| T_{stg} | | -40 ... 125 | $^\circ\text{C}$ | |
| V_{isol} | AC sinus 50 Hz, $t = 1\text{ min}$ | 4000 | V | |

Characteristics

| Symbol | Conditions | min. | typ. | max. | Unit |
|---------------|--|---------------------------|------|------|------------------|
| IGBT | | | | | |
| $V_{CE(sat)}$ | $I_C = 75\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel | $T_j = 25^\circ\text{C}$ | 1.85 | 2.10 | V |
| | | $T_j = 150^\circ\text{C}$ | 2.28 | 2.45 | V |
| V_{CE0} | chipelevel | $T_j = 25^\circ\text{C}$ | 0.80 | 0.90 | V |
| | | $T_j = 150^\circ\text{C}$ | 0.70 | 0.80 | V |
| r_{CE} | $V_{GE} = 15\text{ V}$ chipelevel | $T_j = 25^\circ\text{C}$ | 14 | 16 | $\text{m}\Omega$ |
| | | $T_j = 150^\circ\text{C}$ | 21 | 22 | $\text{m}\Omega$ |
| $V_{GE(th)}$ | $V_{GE} = V_{CE}, I_C = 3\text{ mA}$ | 5 | 5.8 | 6.5 | V |
| I_{CES} | $V_{GE} = 0\text{ V}$ $V_{CE} = 1200\text{ V}$ | $T_j = 25^\circ\text{C}$ | | 1 | mA |
| | | $T_j = 150^\circ\text{C}$ | | - | mA |
| C_{ies} | $V_{CE} = 25\text{ V}$ | | 4.4 | | nF |
| C_{oes} | $V_{GE} = 0\text{ V}$ | | 0.29 | | nF |
| C_{res} | | | 0.24 | | nF |
| Q_G | $V_{GE} = -8\text{ V} \dots +15\text{ V}$ | | 425 | | nC |
| R_{Gint} | $T_j = 25^\circ\text{C}$ | | 10 | | Ω |
| $t_{d(on)}$ | $V_{CC} = 600\text{ V}$ $I_C = 75\text{ A}$ | | 150 | | ns |
| t_r | $V_{GE} = +15/-15\text{ V}$ | $T_j = 150^\circ\text{C}$ | 39 | | ns |
| | | $T_j = 150^\circ\text{C}$ | 11 | | mJ |
| E_{on} | $R_{Gon} = 1\ \Omega$ | | 11 | | mJ |
| $t_{d(off)}$ | $R_{Goff} = 1\ \Omega$ | | 370 | | ns |
| t_f | $di/dt_{on} = 1600\text{ A}/\mu\text{s}$ $di/dt_{off} = 950\text{ A}/\mu\text{s}$ | $T_j = 150^\circ\text{C}$ | 66 | | ns |
| | | $T_j = 150^\circ\text{C}$ | 6.9 | | mJ |
| E_{off} | | | 6.9 | | mJ |
| $R_{th(j-c)}$ | per IGBT | | | 0.38 | K/W |

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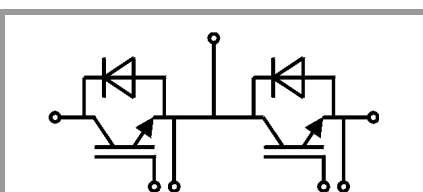
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| Characteristics | | | | | | |
|----------------------|--|---------------------------|------|------|------|------|
| Symbol | Conditions | | min. | typ. | max. | Unit |
| Inverse diode | | | | | | |
| $V_F = V_{EC}$ | $I_F = 75\text{ A}$ $V_{GE} = 0\text{ V}$ chipelevel | $T_j = 25^\circ\text{C}$ | | 2.17 | 2.49 | V |
| | | $T_j = 150^\circ\text{C}$ | | 2.11 | 2.42 | V |
| V_{F0} | chipelevel | $T_j = 25^\circ\text{C}$ | | 1.30 | 1.50 | V |
| | | $T_j = 150^\circ\text{C}$ | | 0.90 | 1.10 | V |
| r_F | chipelevel | $T_j = 25^\circ\text{C}$ | | 12 | 13 | mΩ |
| | | $T_j = 150^\circ\text{C}$ | | 16 | 18 | mΩ |
| I_{RRM} | $I_F = 75\text{ A}$ | $T_j = 150^\circ\text{C}$ | | 37 | | A |
| Q_{rr} | $di/dt_{off} = 990\text{ A}/\mu\text{s}$ $V_{GE} = \pm 15\text{ V}$ | $T_j = 150^\circ\text{C}$ | | 12.6 | | μC |
| E_{rr} | $V_{CC} = 600\text{ V}$ | $T_j = 150^\circ\text{C}$ | | 4.7 | | mJ |
| $R_{th(j-c)}$ | per diode | | | | 0.58 | K/W |
| Module | | | | | | |
| L_{CE} | | | | 30 | | nH |
| $R_{CC'+EE'}$ | measured per switch | $T_c = 25^\circ\text{C}$ | | 0.65 | | mΩ |
| | | $T_c = 125^\circ\text{C}$ | | 1.09 | | mΩ |
| $R_{th(c-s)}$ | calculated without thermal coupling ($\lambda_{grease} = 0.81\text{ W}/(\text{m}^2\text{K})$) | | | 0.04 | 0.05 | K/W |
| M_s | to heat sink M6 | | 3 | | 5 | Nm |
| M_t | | | | | | Nm |
| | to terminals M5 | | 2.5 | | 5 | Nm |
| w | | | | | 160 | g |



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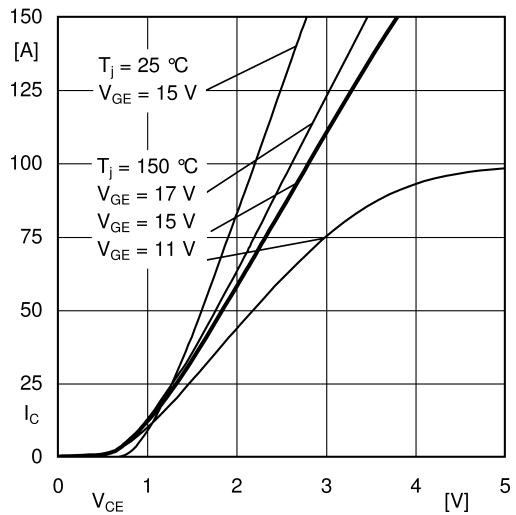


Fig. 1: Typ. output characteristic, inclusive R_{CC'+EE'}

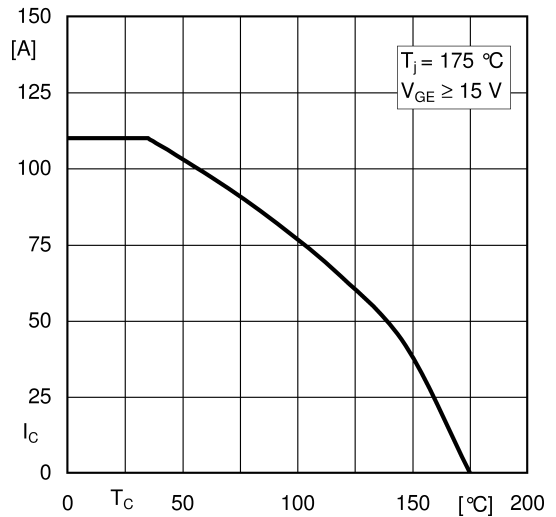


Fig. 2: Rated current vs. temperature I_C = f(T_C)

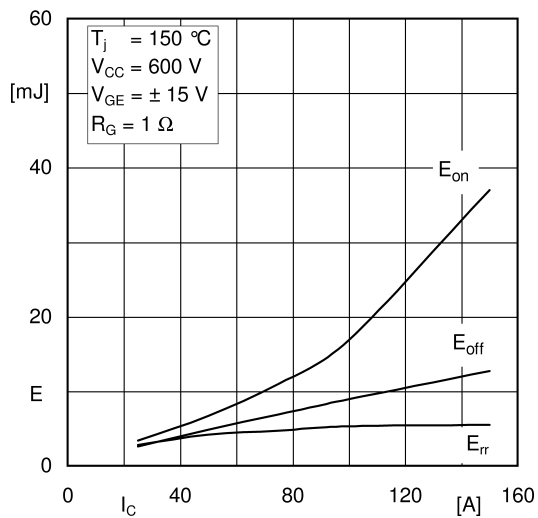


Fig. 3: Typ. turn-on /-off energy = f(I_C)

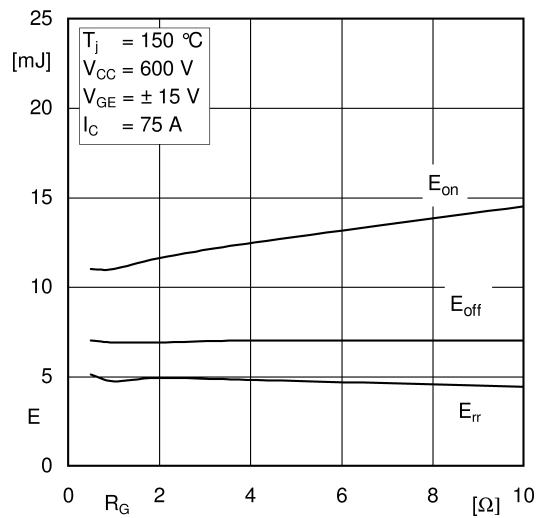


Fig. 4: Typ. turn-on /-off energy = f(R_G)

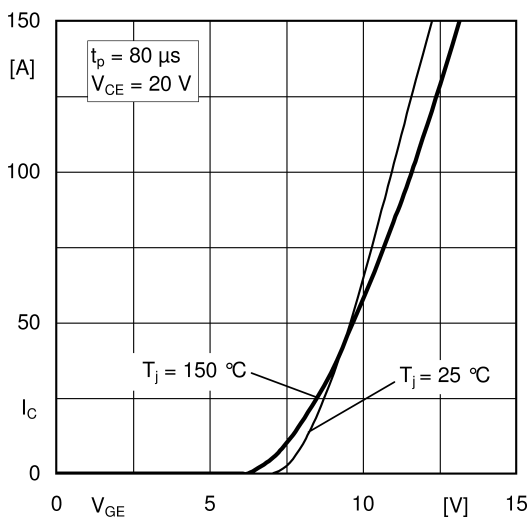


Fig. 5: Typ. transfer characteristic

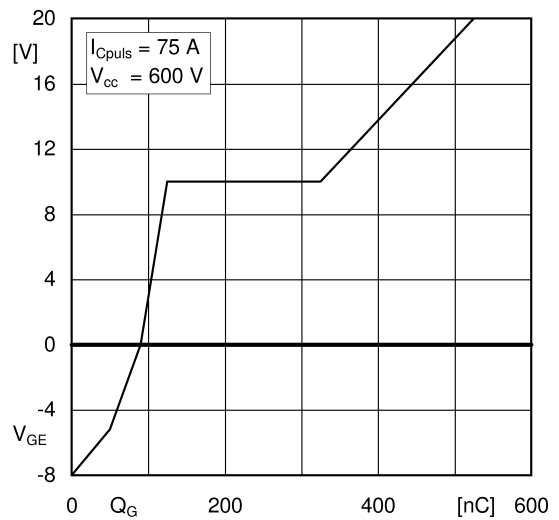


Fig. 6: Typ. gate charge characteristic

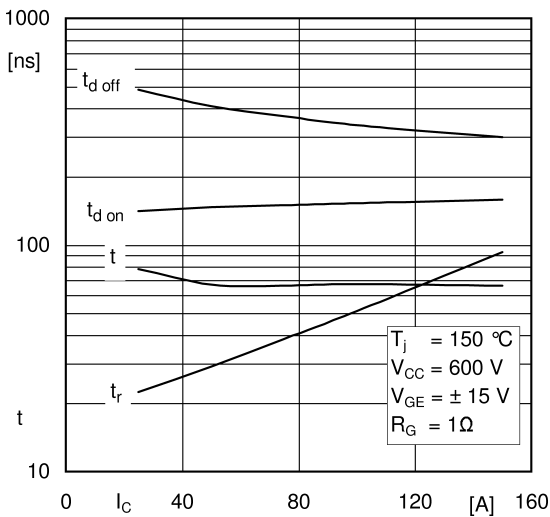


Fig. 7: Typ. switching times vs. I_C

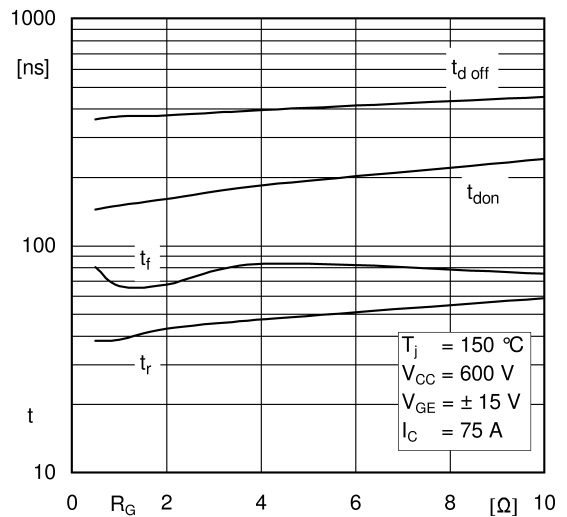


Fig. 8: Typ. switching times vs. gate resistor R_G

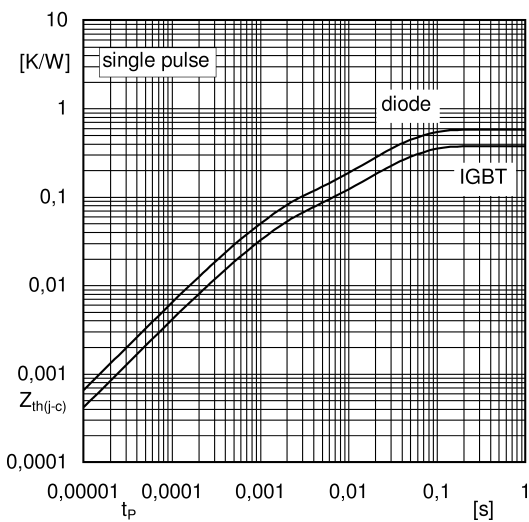


Fig. 9: Transient thermal impedance

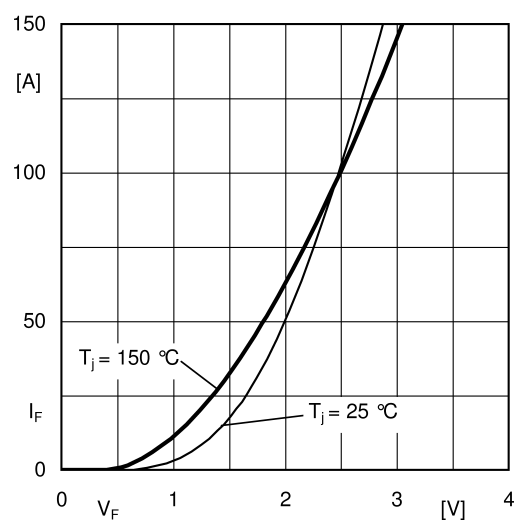


Fig. 10: Typ. CAL diode forward charact., incl. R_{CC+EE}

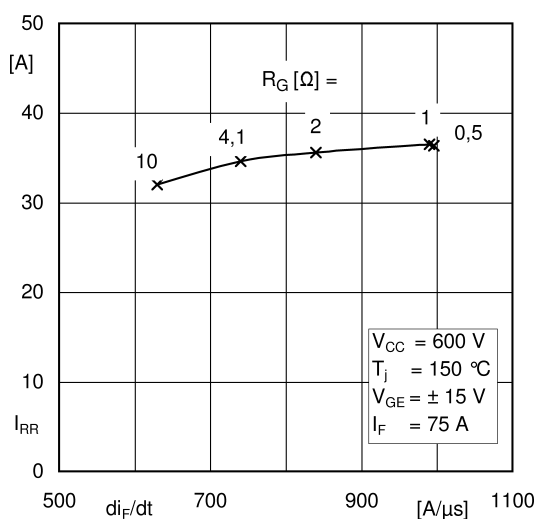


Fig. 11: CAL diode peak reverse recovery current

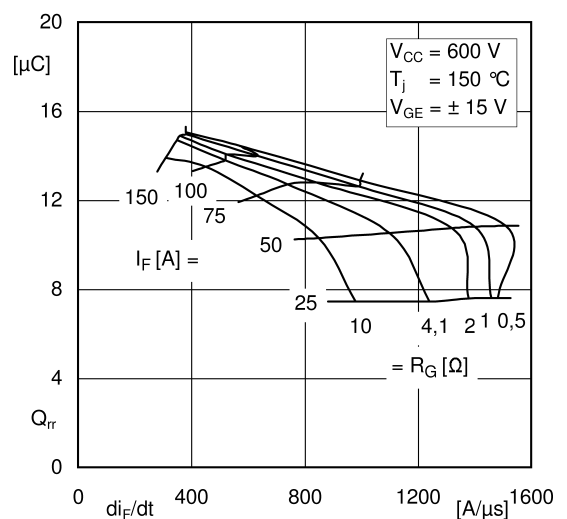
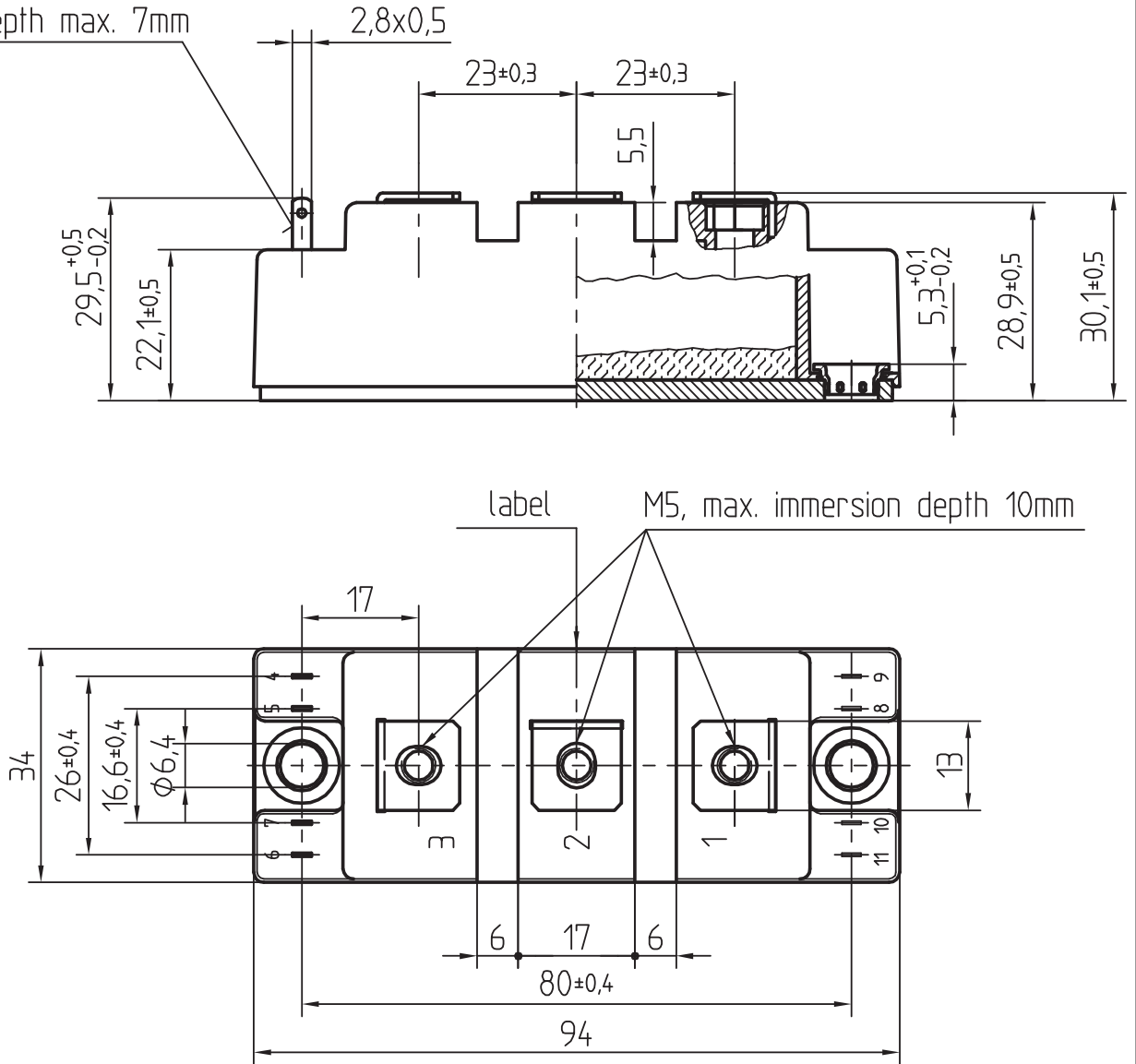


Fig. 12: Typ. CAL diode peak reverse recovery charge

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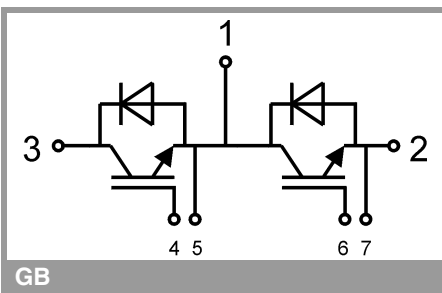
Dimensions in mm

Plug in depth max. 7mm



General tolerance +/- 0,5 mm

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

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