# SEMiX 202GB12T4s


SEMiX®2s

## Trench IGBT Modules

**SEMiX 202GB12T4s**

Target Data

### Features

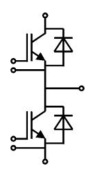
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability

### Typical Applications

- AC inverter drives
- UPS
- Electronic Welding

### Remarks

- Case temperature limited to $T_C$=125°C max.
- Product reliability results are valid for $T_j$=150°C



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| **Absolute Maximum Ratings** | | $T_{case}$ = 25°C, unless otherwise specified | | |
|---|---|---|---|---|
| **Symbol** | **Conditions** | | **Values** | **Units** |
| **IGBT** | | | | |
| $V_{CES}$ | $T_j$ = 25 °C | | 1200 | V |
| $I_C$ | $T_j$ = 175 °C | $T_c$ = 25 °C | 310 | A |
| | | $T_c$ = 80 °C | 240 | A |
| $I_{CRM}$ | $I_{CRM}$=3x$I_{Cnom}$ | | 600 | A |
| $V_{GES}$ | | | ± 20 | V |
| $t_{psc}$ | $V_{CC}$ = 600 V; $V_{GE}$ ≤ 20 V; $V_{CES}$ < 1200 V | $T_j$ = 150 °C | 10 | µs |
| **Inverse Diode** | | | | |
| $I_F$ | $T_j$ = 175 °C | $T_c$ = 25 °C | 230 | A |
| | | $T_c$ = 80 °C | 175 | A |
| $I_{FRM}$ | $I_{FRM}$=3x$I_{Fnom}$ | | 600 | A |
| **Module** | | | | |
| $I_{t(RMS)}$ | | | 600 | A |
| $T_{vj}$ | | | - 40 ... + 175 | °C |
| $T_{stg}$ | | | - 40 ... + 125 | °C |
| $V_{isol}$ | AC, 1 min. | | 4000 | V |

| **Characteristics** | | $T_{case}$ = 25°C, unless otherwise specified | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Conditions** | | **min.** | **typ.** | **max.** | **Units** |
| **IGBT** | | | | | | |
| $V_{GE(th)}$ | $V_{GE}$ = $V_{CE}$, $I_C$ = 8 mA | | 5 | 5,8 | 6,5 | V |
| $I_{CES}$ | $V_{GE}$ = 0 V, $V_{CE}$ = $V_{CES}$ | $T_j$ = 25 °C | | | | mA |
| $V_{CE0}$ | | $T_j$ = 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 | 5,5 | mΩ |
| | | $T_j$ = 150°C | | 7,5 | 8 | mΩ |
| $V_{CE(sat)}$ | $I_{Cnom}$ = 200 A, $V_{GE}$ = 15 V | $T_j$ = 25°$C_{chiplev.}$ | | 1,8 | 2 | V |
| | | $T_j$ = 150°$C_{chiplev.}$ | | 2,2 | 2,4 | V |
| $C_{ies}$ | | | | 12,4 | | nF |
| $C_{oes}$ | $V_{CE}$ = 25, $V_{GE}$ = 0 V | f = 1 MHz | | 0,8 | | nF |
| $C_{res}$ | | | | 0,7 | | nF |
| $Q_G$ | $V_{GE}$ = -8 ... +15V | | | 1150 | | nC |
| $R_{Gint}$ | $T_j$ = 25 °C | | | 3,8 | | Ω |
| $t_{d(on)}$ | | | | | | ns |
| $t_r$ | $R_{Gon}$ = Ω | $V_{CC}$ = V | | | | ns |
| $E_{on}$ | | $I_{Cnom}$= A | | 22 | | mJ |
| $t_{d(off)}$ | $R_{Goff}$ = Ω | $T_j$ = 150 °C | | | | ns |
| $t_f$ | | | | | | ns |
| $E_{off}$ | | | | 22 | | mJ |
| $R_{th(j-c)}$ | per IGBT | | | | 0,14 | K/W |

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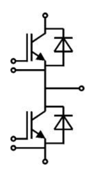

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| Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Conditions** | | **min.** | **typ.** | **max.** | **Units** |
| **Inverse Diode** | | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom}$ = 200 A; $V_{GE}$ = 0 V | $T_j$ = 25 °$C_{chiplev.}$ | | 2,2 | 2,5 | V |
| | | $T_j$ = 150 °$C_{chiplev.}$ | | 2,1 | 2,45 | 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 | | 4,5 | 5 | mΩ |
| | | $T_j$ = 150 °C | | 6 | 6,8 | mΩ |
| $I_{RRM}$ | $I_{Fnom}$ = 200 A | $T_j$ = 150 °C | | | | A |
| $Q_{rr}$ | | | | | | µC |
| $E_{rr}$ | $V_{GE}$ = -15 V; $V_{CC}$ = 600 V | | | 15 | | mJ |
| $R_{th(j-c)D}$ | per diode | | | | 0,26 | K/W |
| **Module** | | | | | | |
| $L_{CE}$ | | | | 18 | | nH |
| $R_{CC'+EE'}$ | res., terminal-chip | $T_{case}$= 25 °C | | 0,7 | | mΩ |
| | | $T_{case}$= 125 °C | | 1 | | mΩ |
| $R_{th(c-s)}$ | per module | | | 0,045 | | K/W |
| $M_s$ | to heat sink (M5) | | 3 | | 5 | Nm |
| $M_t$ | to terminals (M6) | | 2,5 | | 5 | Nm |
| w | | | | | 250 | g |
| **Temperature sensor** | | | | | | |
| $R_{100}$ | $T_c$=100°C ($R_{25}$=5 kΩ) | | | 0,493±5% | | kΩ |
| $B_{100/125}$ | R(T)=$R_{100}$exp[$B_{100/125}$(1/T-1/$T_{100}$)]; T[K] | | | 3550±2% | | K |

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

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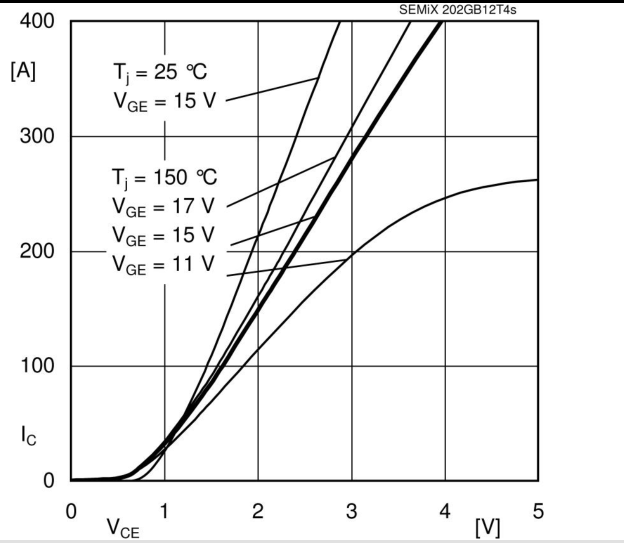

Fig. 1 Typ. output characteristic, inclusive $R_{CC'+ EE'}$

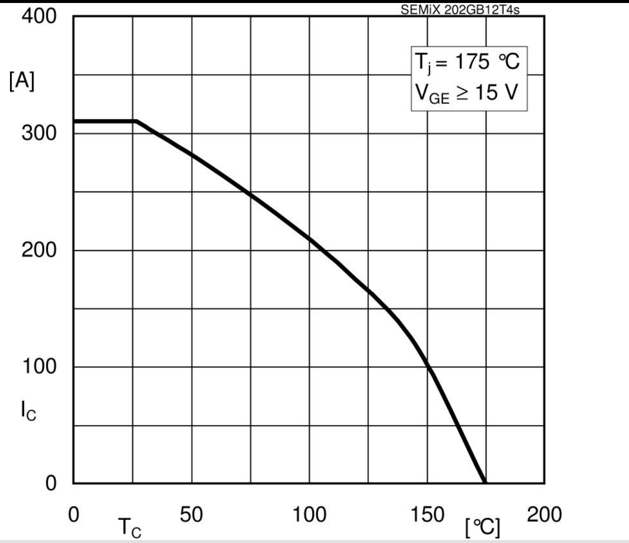

Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

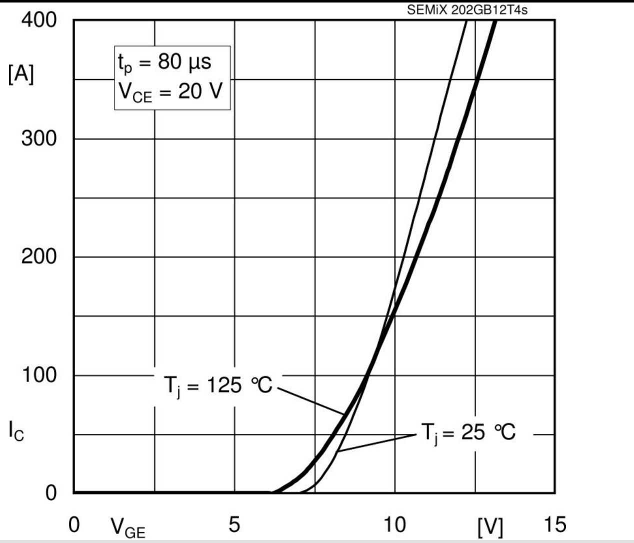

Fig. 5 Typ. transfer characteristic

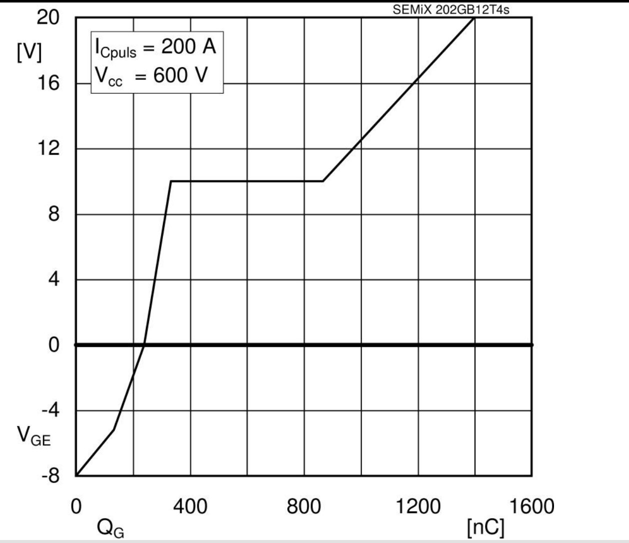

Fig. 6 Typ. gate charge characteristic


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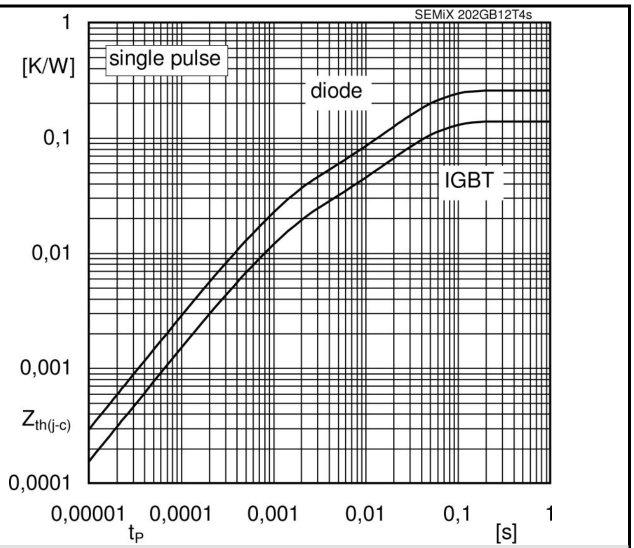


Fig. 9 Typ. transient thermal impedance

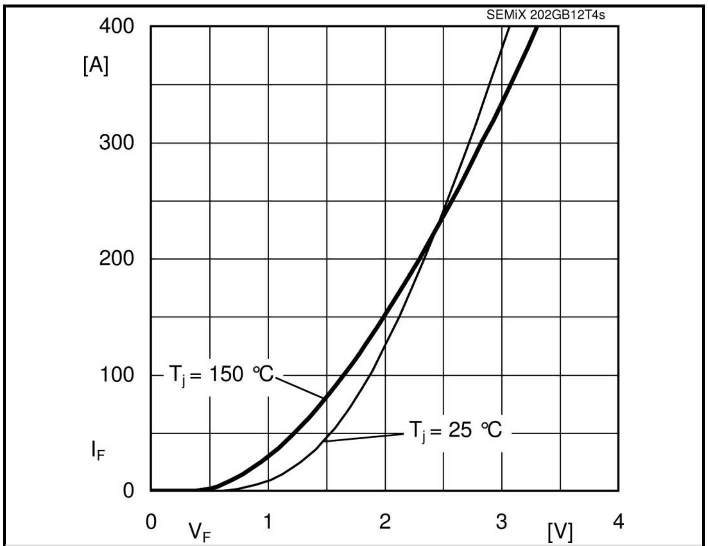


Fig. 10 Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

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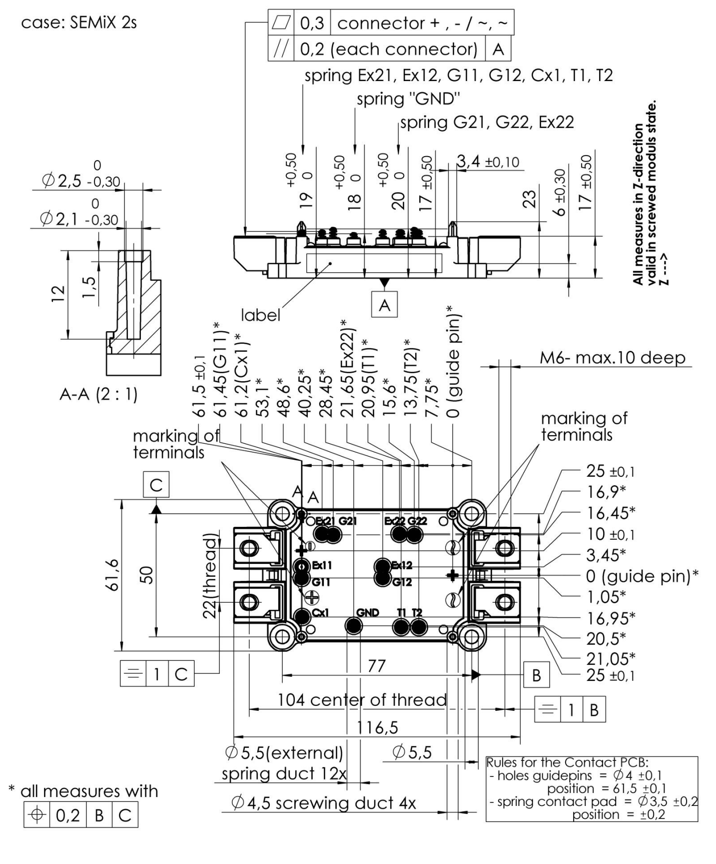
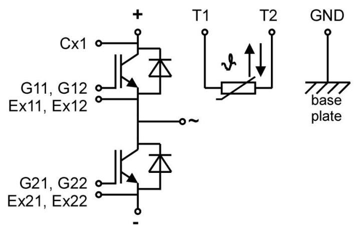



Case SEMiX 2s




Pinout GB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