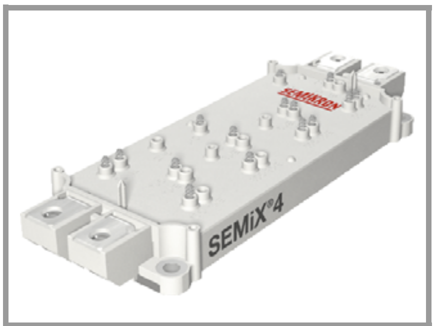


**SEMiX®4s**

## Trench IGBT Modules

### SEMiX904GB126HDs

Preliminary Data

### Features

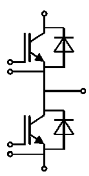
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- UL recognised file no. E63532

### Typical Applications

- AC inverter drives
- UPS
- Electronic Welding

### Remarks

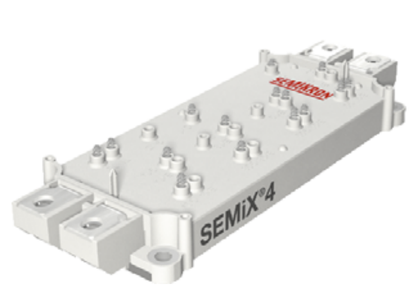
- Case temperatur limited to $T_C$=125°C max.
- Not for new design



**GB**

| Absolute Maximum Ratings | | | | |
|---|---|---|---|---|
| **Symbol** | **Conditions** | | **Values** | **Unit** |
| **IGBT** | | | | |
| $V_{CES}$ | | | 1200 | V |
| $I_C$ | $T_j$ = 150°C | $T_c$ = 25°C | 821 | A |
| | | $T_c$ = 80°C | 572 | A |
| $I_{CRM}$ | $I_{CRM}$ = 2x$I_{Cnom}$ | | 1200 | A |
| $V_{GES}$ | | | -20 ... 20 | V |
| $t_{psc}$ | $V_{CC}$ = 600V<br>$V_{GE} \leq$ 20V<br>$T_j$ = 125°C<br>$V_{CES} \leq$ 1200V | | 10 | µs |
| $T_j$ | | | -40 ... 150 | °C |
| **Inverse diode** | | | | |
| $I_F$ | $T_j$ = 150°C | $T_c$ = 25°C | 752 | A |
| | | $T_c$ = 80°C | 516 | A |
| $I_{FRM}$ | $I_{FRM}$ = 2x$I_{Fnom}$ | | 1200 | A |
| $I_{FSM}$ | $t_p$ = 10ms, half sine wave, $T_j$ = 25°C | | 3600 | A |
| $T_j$ | | | -40 ... 150 | °C |
| **Module** | | | | |
| $I_{t(RMS)}$ | | | 600 | A |
| $T_{stg}$ | | | -40 ... 125 | °C |
| $V_{isol}$ | AC sinus 50Hz, t = 60s | | 4000 | V |

| Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Conditions** | | **min.** | **typ.** | **max.** | **Unit** |
| **IGBT** | | | | | | |
| $V_{CE(sat)}$ | $I_{Cnom}$ = 600A<br>$V_{GE}$ = 15V<br>chiplevel | $T_j$ = 25°C | | 1.7 | 2.1 | V |
| | | $T_j$ = 125°C | | 2.00 | 2.45 | V |
| $V_{CE0}$ | | $T_j$ = 25°C | | 1 | 1.2 | V |
| | | $T_j$ = 125°C | | 0.9 | 1.1 | V |
| $r_{CE}$ | $V_{GE}$ = 15V | $T_j$ = 25°C | | 1.2 | 1.5 | mΩ |
| | | $T_j$ = 125°C | | 1.8 | 2.3 | mΩ |
| $V_{GE(th)}$ | $V_{GE}$=$V_{CE}$, $I_C$ = 24mA | | 5 | 5.8 | 6.5 | V |
| $I_{CES}$ | $V_{GE}$ = 0V<br>$V_{CE}$ = 1200V | $T_j$ = 25°C | | 0.12 | 0.36 | mA |
| | | $T_j$ = 125°C | | | | mA |
| $C_{ies}$ | $V_{CE}$ = 25V<br>$V_{GE}$ = 0V | f = 1MHz | | 43.1 | | nF |
| $C_{oes}$ | | f = 1MHz | | 2.25 | | nF |
| $C_{res}$ | | f = 1MHz | | 1.95 | | nF |
| $Q_G$ | $V_{GE}$ = - 8 V...+ 15 V | | | 4800 | | nC |
| $R_{Gint}$ | $T_j$ = 25°C | | | 1.25 | | Ω |
| $t_{d(on)}$ | $V_{CC}$ = 600V<br>$I_{Cnom}$ = 600A<br>$T_j$ = 125°C<br>$R_{G\ on}$ = 1.6Ω<br>$R_{G\ off}$ = 1.6Ω | | | 440 | | ns |
| $t_r$ | | | | 85 | | ns |
| $E_{on}$ | | | | 60 | | mJ |
| $t_{d(off)}$ | | | | 710 | | ns |
| $t_f$ | | | | 130 | | ns |
| $E_{off}$ | | | | 88 | | mJ |
| $R_{th(j-c)}$ | per IGBT | | | | 0.05 | K/W |




SEMiX®4s

## Trench IGBT Modules

**SEMiX904GB126HDs**

Preliminary Data

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- High short circuit capability
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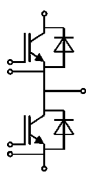
### Typical Applications

- AC inverter drives
- UPS
- Electronic Welding

### Remarks

- Case temperatur limited to $T_C$=125°C max.
- Not for new design

| Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Conditions** | | **min.** | **typ.** | **max.** | **Unit** |
| **Inverse diode** | | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom}$ = 600A<br>$V_{GE}$ = 0V<br>chiplevel | $T_j$ = 25°C | | 1.6 | 1.8 | V |
| | | $T_j$ = 125°C | | 1.6 | 1.8 | V |
| $V_{F0}$ | | $T_j$ = 25°C | 0.9 | 1 | 1.1 | V |
| | | $T_j$ = 125°C | 0.7 | 0.8 | 0.9 | V |
| $r_F$ | | $T_j$ = 25°C | 0.8 | 1.0 | 1.2 | mΩ |
| | | $T_j$ = 125°C | 1.2 | 1.3 | 1.5 | mΩ |
| $I_{RRM}$ | $I_{Fnom}$ = 600A<br>$di/dt_{off}$ = 8400A/µs<br>$V_{GE}$ = -15V<br>$V_{CC}$ = 600V | $T_j$ = 125°C | | 625 | | A |
| $Q_{rr}$ | | $T_j$ = 125°C | | 165 | | µC |
| $E_{rr}$ | | $T_j$ = 125°C | | 75 | | mJ |
| $R_{th(j-c)D}$ | per diode | | | | 0.081 | K/W |
| **Module** | | | | | | |
| $L_{CE}$ | | | | 22 | | nH |
| $R_{CC'+EE'}$ | res., terminal-chip | $T_C$ = 25°C | | 0.7 | | mΩ |
| | | $T_C$ = 125°C | | 1 | | mΩ |
| $R_{th(c-s)}$ | per module | | | 0.03 | | K/W |
| $M_s$ | to heat sink (M5) | | 3 | | 5 | Nm |
| $M_t$ | to terminals (M6) | | 2.5 | | 5 | Nm |
| w | | | | | 400 | 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 |



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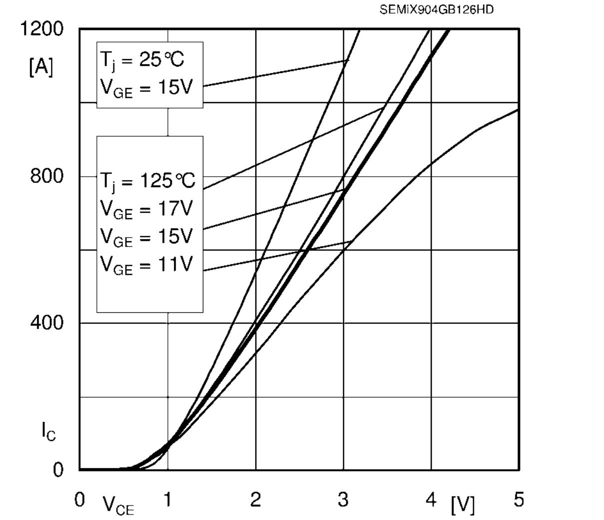



Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

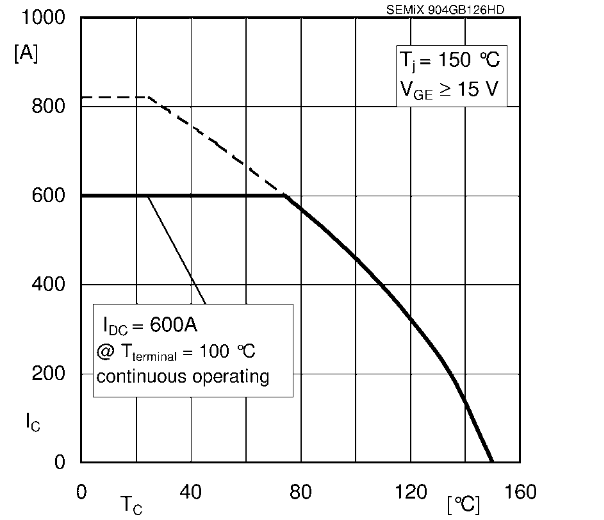



Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

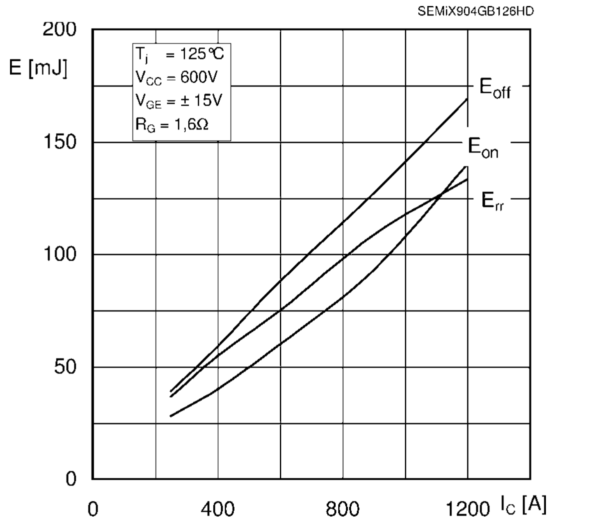



Fig. 3 Typ. turn-on /-off energy = f ($I_C$)

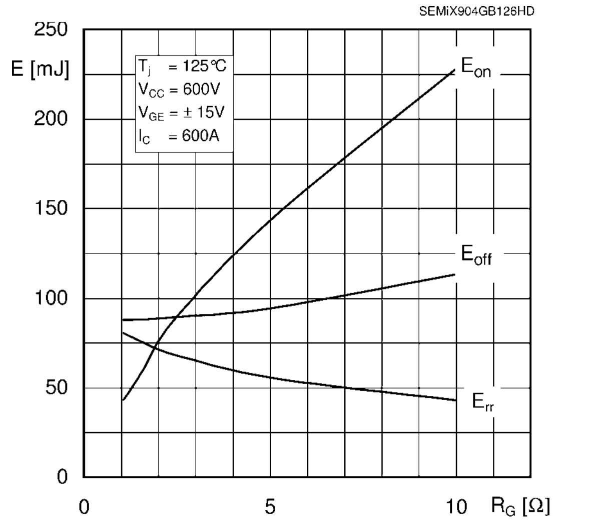



Fig. 4 Typ. turn-on /-off energy = f ($R_G$)

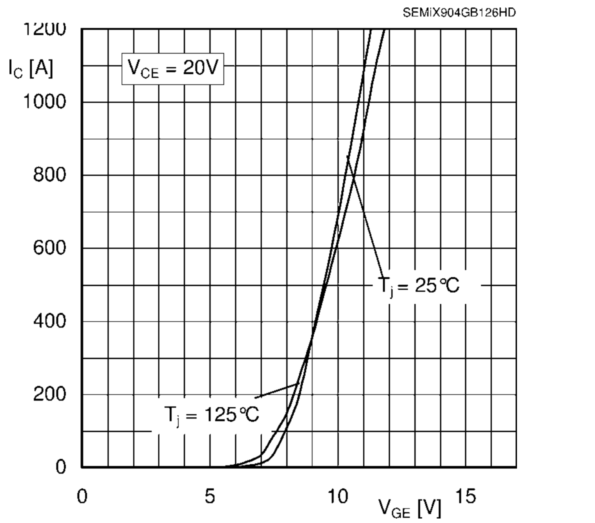



Fig. 5 Typ. transfer characteristic

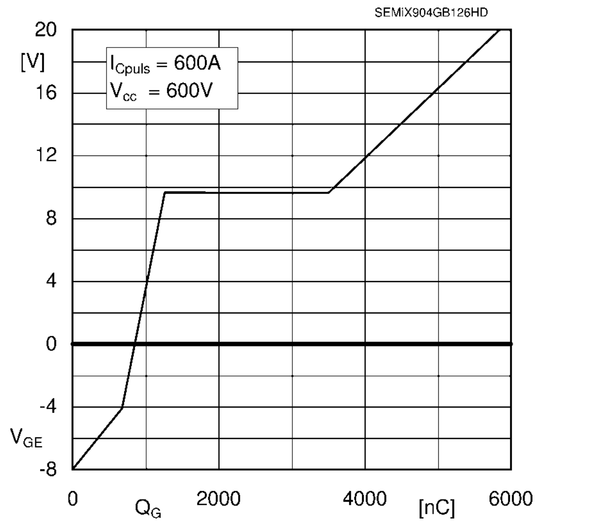



Fig. 6 Typ. gate charge characteristic

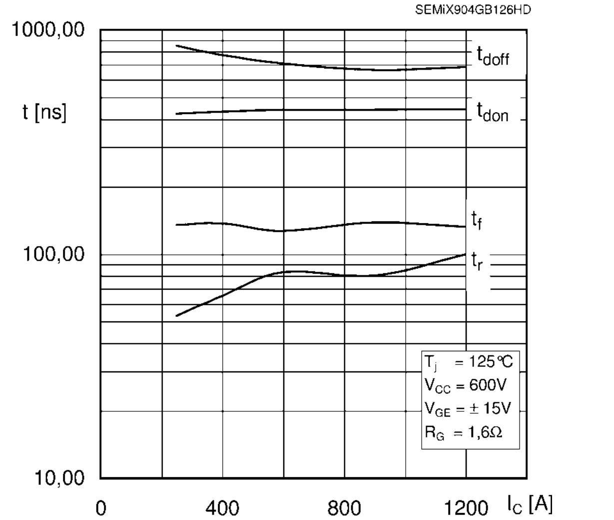



Fig. 7 Typ. switching times vs. $I_C$

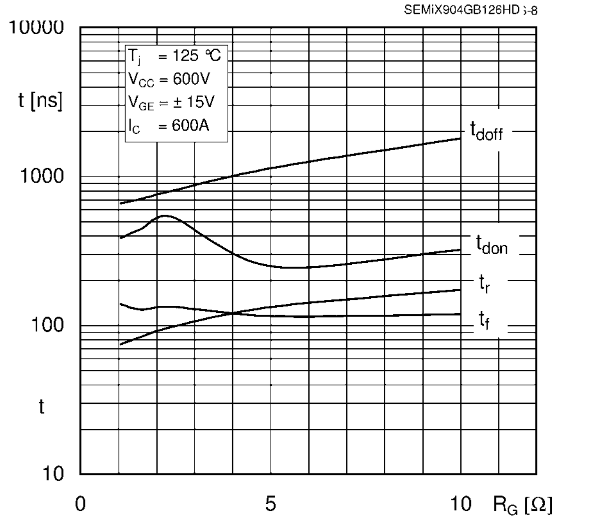



Fig. 8 Typ. switching times vs. gate resistor $R_G$

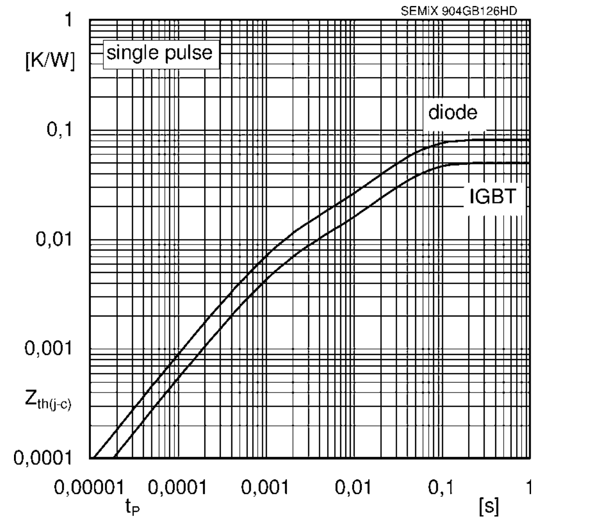



Fig. 9 Typ. transient thermal impedance

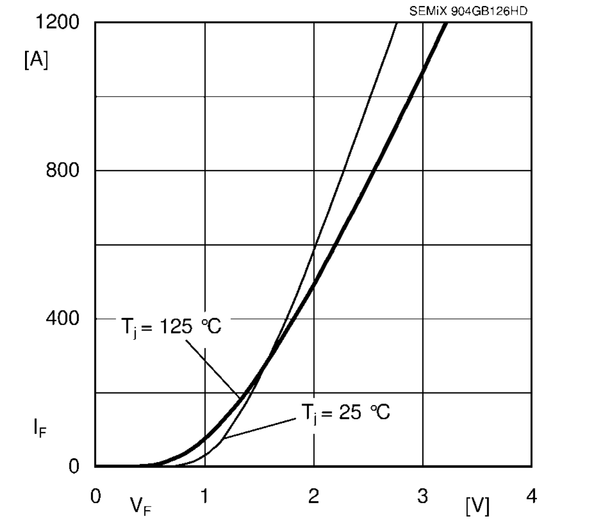



Fig. 10 Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

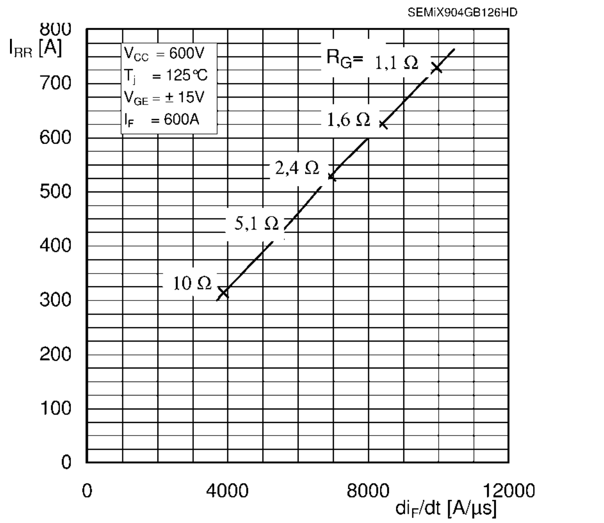



Fig. 11 Typ. CAL diode peak reverse recovery current

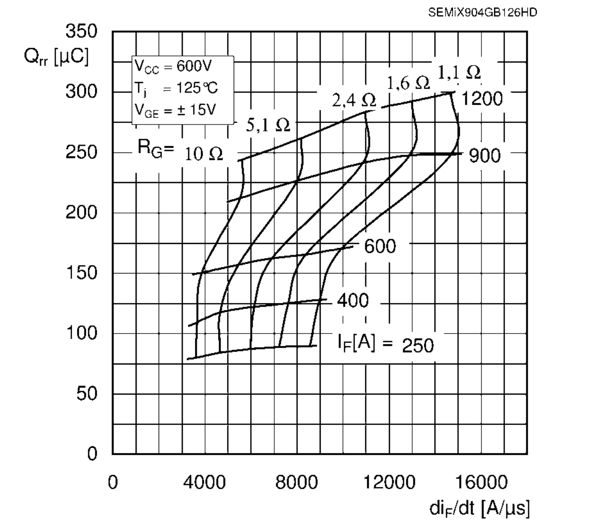
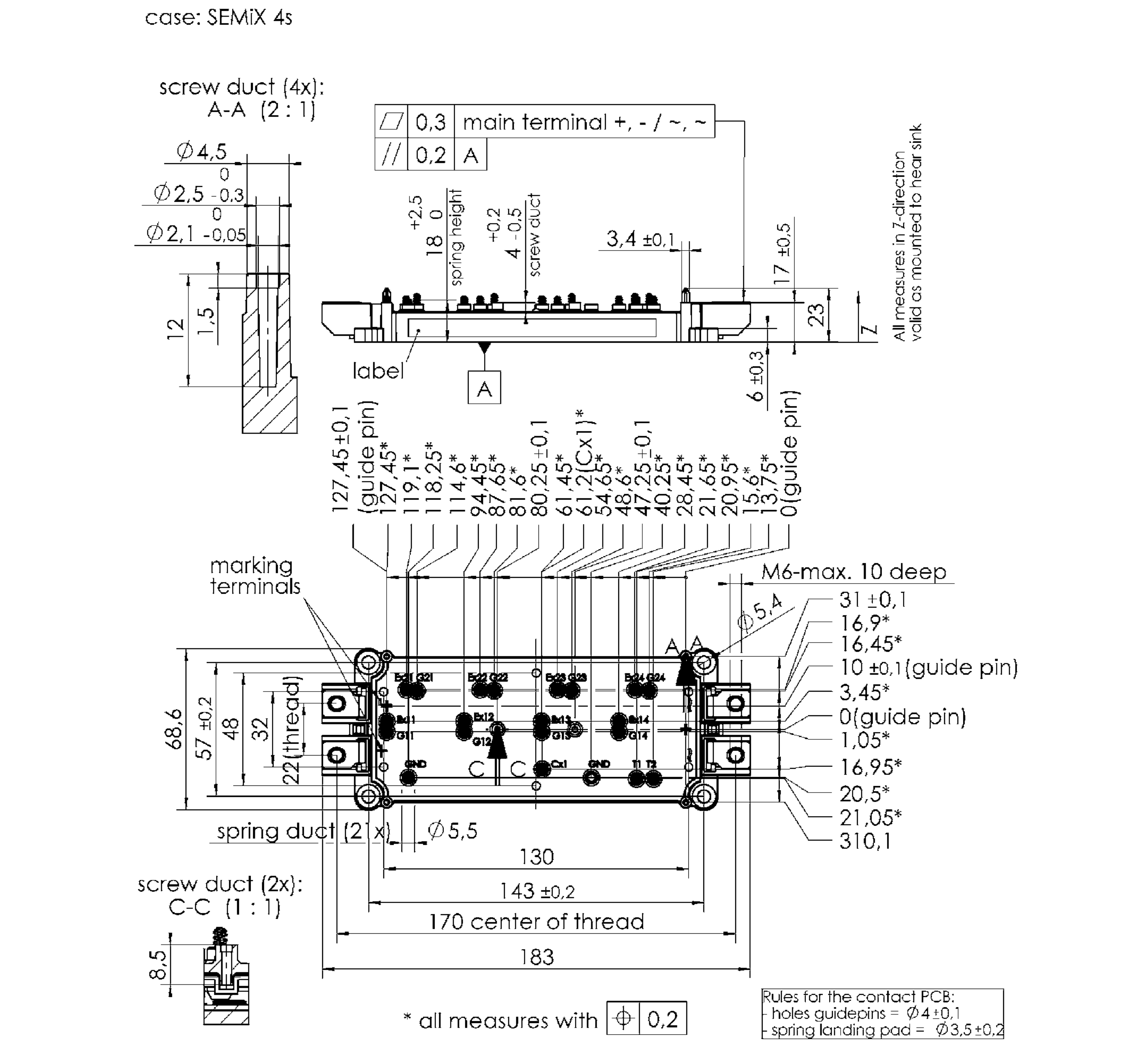



Fig. 12 Typ. CAL diode recovery charge

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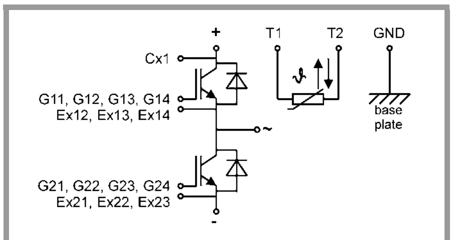


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This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX

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