# SEMiX 302GB12T4s


**SEMiX®2s**

## Trench IGBT Modules

**SEMiX 302GB12T4s**

**SEMiX 302GAL12T4s**

**SEMiX 302GAR12T4s**

Target Data

### Features

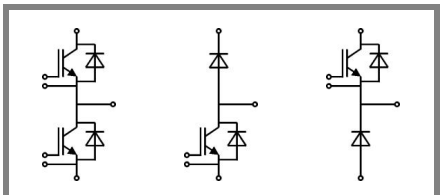
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability

### 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
- Dynamic values apply to the following combination of resistors: $R_{Gon,main}$=0,5Ω, $R_{Goff,main}$=0,5Ω, $R_{G,x}$=2,2Ω each, $R_{E,x}$=0,5Ω each



GB GAL GAR

**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 | 460 | A |
| | | $T_c$ = 80 °C | 355 | A |
| $I_{CRM}$ | $I_{CRM}$=3x$I_{Cnom}$ | | 900 | A |
| $V_{GES}$ | | | ± 20 | V |
| $t_{psc}$ | $V_{CC}$ = 600 V; $V_{GE} \leq$ 20 V; $V_{CES}$ < 1200 V | $T_j$ = 150 °C | 10 | µs |
| **Inverse Diode** | | | | |
| $I_F$ | $T_j$ = 175 °C | $T_c$ = 25 °C | 355 | A |
| | | $T_c$ = 80 °C | 265 | A |
| $I_{FRM}$ | $I_{FRM}$=3x$I_{Fnom}$ | | 900 | 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** | | | | | | |
| $V_{GE(th)}$ | $V_{GE}$ = $V_{CE}$, $I_C$ = 12 mA | | 5 | 5,8 | 6,5 | V |
| $I_{CES}$ | $V_{GE}$ = 0 V, $V_{CE}$ = $V_{CES}$ | $T_j$ = 25 °C | | | 0,3 | 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 | | 3,3 | 3,7 | mΩ |
| | | $T_j$ = 150°C | | 5 | 5,3 | mΩ |
| $V_{CE(sat)}$ | $I_{Cnom}$ = 300 A, $V_{GE}$ = 15 V | $T_j$ = 25°C$_{chiplev.}$ | | 1,8 | 2 | V |
| | | $T_j$ = 150°C$_{chiplev.}$ | | 2,2 | 2,4 | V |
| $C_{ies}$ | | | | 18,6 | | nF |
| $C_{oes}$ | $V_{CE}$ = 25, $V_{GE}$ = 0 V | f = 1 MHz | | 1,2 | | nF |
| $C_{res}$ | | | | 1 | | nF |
| $Q_G$ | $V_{GE}$ = -8 ... +15V | | | 1700 | | nC |
| $R_{Gint}$ | $T_j$ = 25 °C | | | 2,5 | | Ω |
| $t_{d(on)}$ | | | | 260 | | ns |
| $t_r$ | $R_{Gon}$ = 1,9 Ω | $V_{CC}$ = 600V | | 60 | | ns |
| $E_{on}$ | di/dt = 5000 A/µs | $I_{Cnom}$= 300A | | 30 | | mJ |
| $t_{d(off)}$ | $R_{Goff}$ = 1,9 Ω | $T_j$ = 150 °C | | 490 | | ns |
| $t_f$ | di/dt = 2800 A/µs | | | 90 | | ns |
| $E_{off}$ | | | | 33 | | mJ |
| $R_{th(j-c)}$ | per IGBT | | | | 0,096 | K/W |

# SEMiX 302GB12T4s


**SEMiX®2s**

## Trench IGBT Modules

**SEMiX 302GB12T4s**

**SEMiX 302GAL12T4s**

**SEMiX 302GAR12T4s**

Target Data

### Features

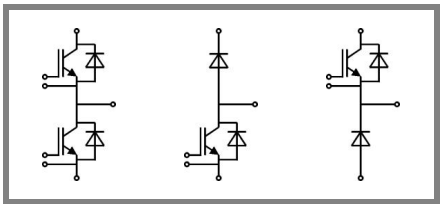
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability

### 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
- Dynamic values apply to the following combination of resistors: $R_{Gon,main}$=0,5Ω, $R_{Goff,main}$=0,5Ω, $R_{G,x}$=2,2Ω each, $R_{E,x}$=0,5Ω each



GB GAL GAR

**Characteristics**

| Symbol | Conditions | | min. | typ. | max. | Units |
|---|---|---|---|---|---|---|
| **Inverse Diode** | | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom}$ = 300 A; $V_{GE}$ = 0 V | $T_j$ = 25 °C$_{chiplev.}$ | | 2,15 | 2,45 | V |
| | | $T_j$ = 150 °C$_{chiplev.}$ | | 2,05 | 2,4 | 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 | | 2,8 | 3,2 | mΩ |
| | | $T_j$ = 150 °C | | 3,8 | 4,3 | mΩ |
| $I_{RRM}$ | $I_{Fnom}$ = 300 A | $T_j$ = 150 °C | | 230 | | A |
| $Q_{rr}$ | di/dt = 4300 A/µs | | | 50 | | µC |
| $E_{rr}$ | $V_{GE}$ = -15 V; $V_{CC}$ = 600 V | | | 19 | | mJ |
| $R_{th(j-c)D}$ | per diode | | | | 0,17 | 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.

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability.

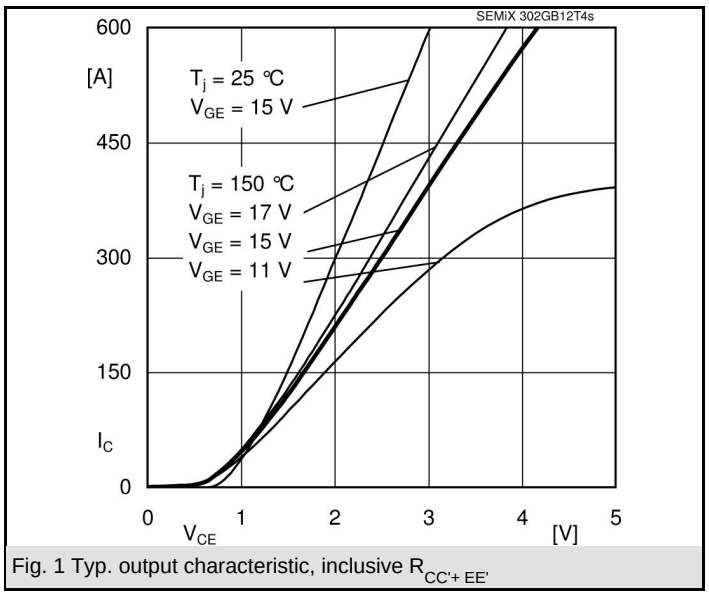



Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

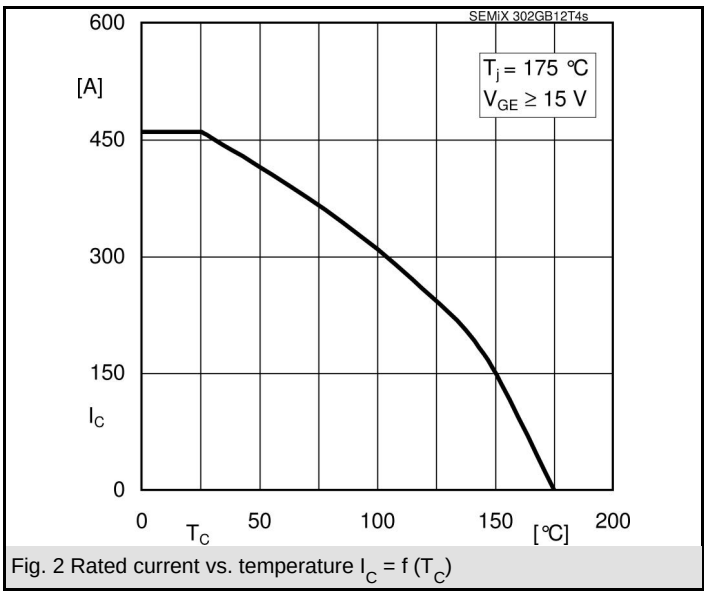



Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

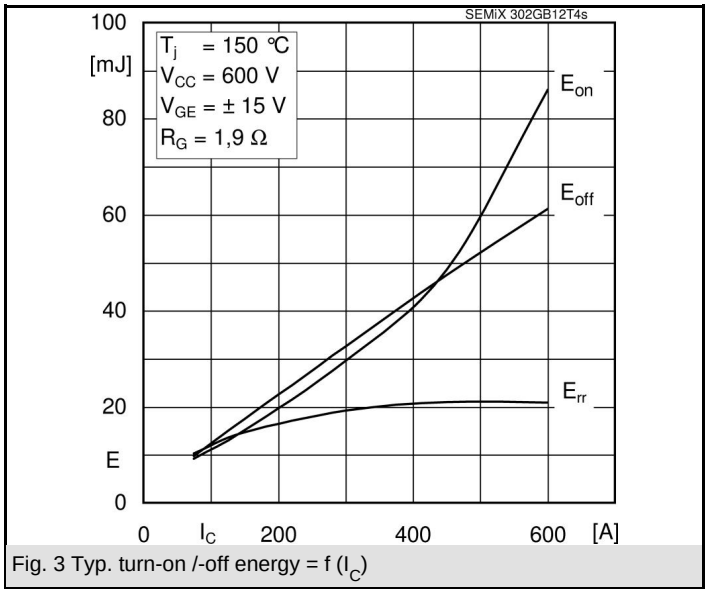



Fig. 3 Typ. turn-on /-off energy = f ($I_C$)

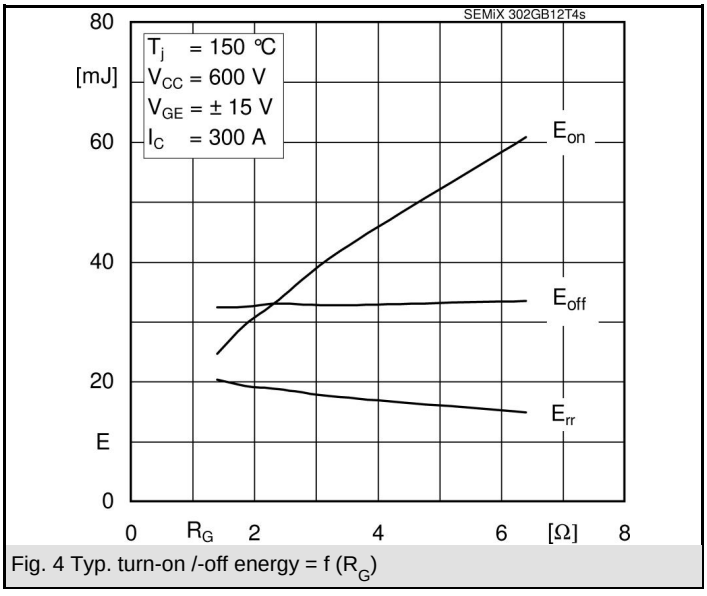



Fig. 4 Typ. turn-on /-off energy = f ($R_G$)

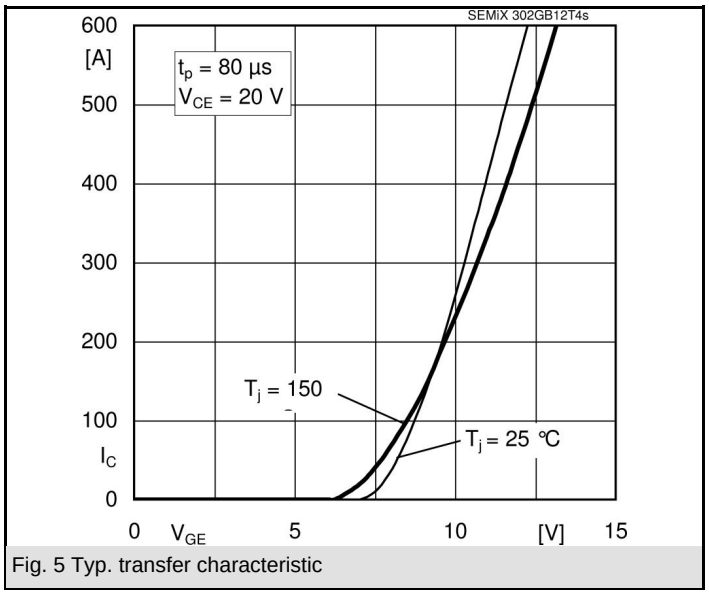



Fig. 5 Typ. transfer characteristic

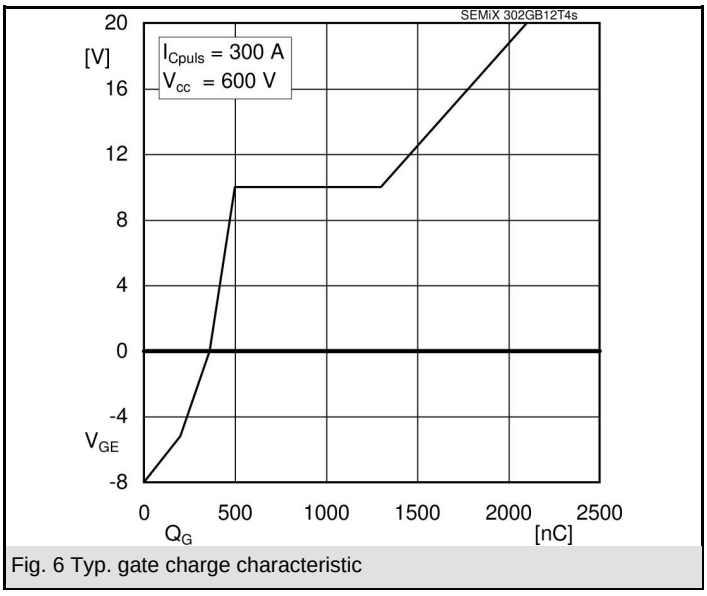



Fig. 6 Typ. gate charge characteristic

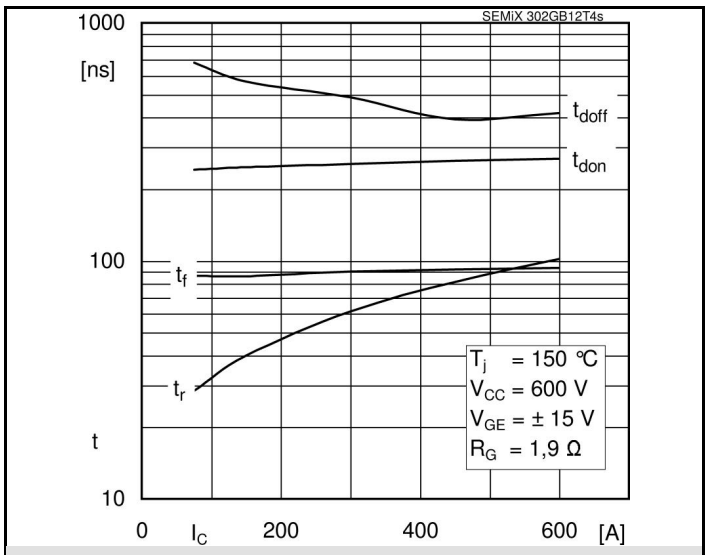



Fig. 7 Typ. switching times vs. $I_C$

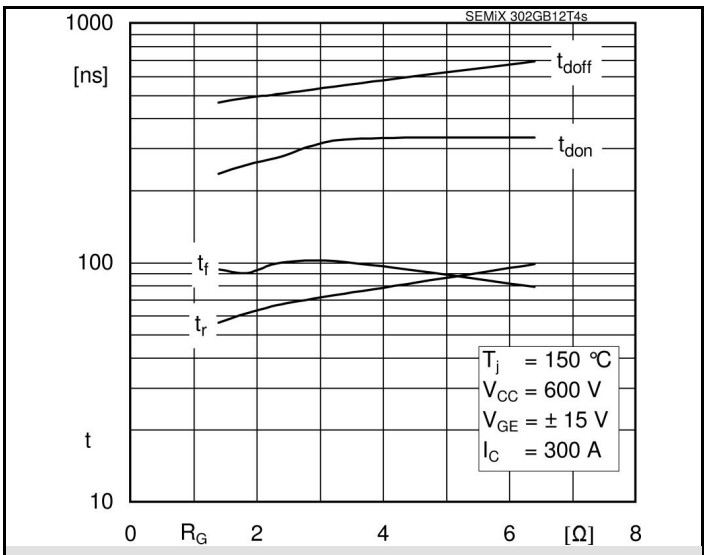



Fig. 8 Typ. switching times vs. gate resistor $R_G$

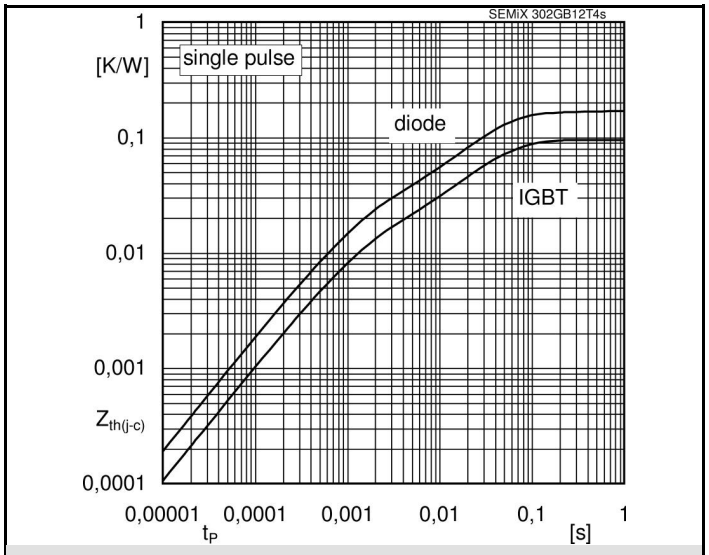



Fig. 9 Typ. transient thermal impedance

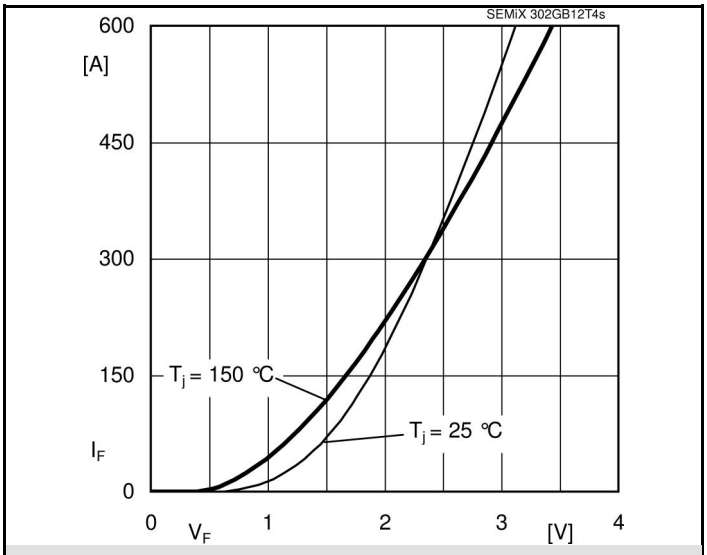



Fig. 10 Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

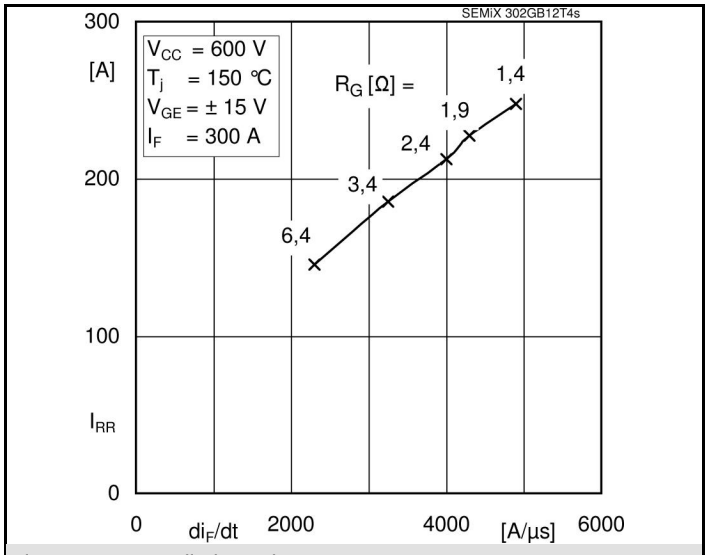



Fig. 11 Typ. CAL diode peak reverse recovery current

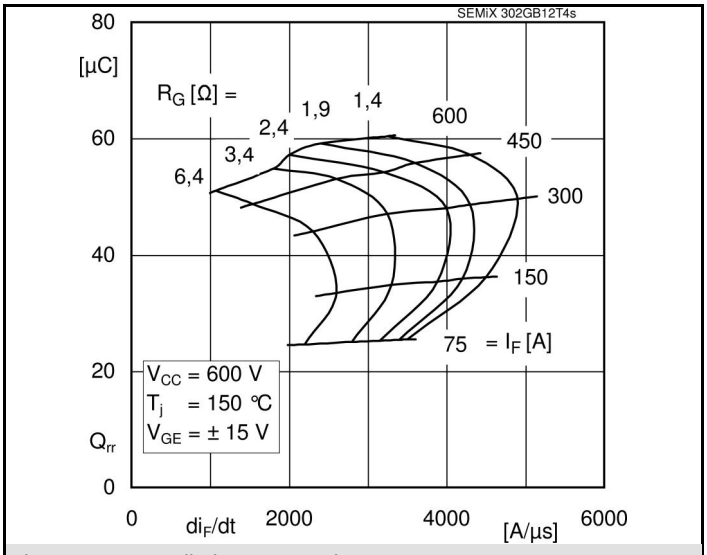
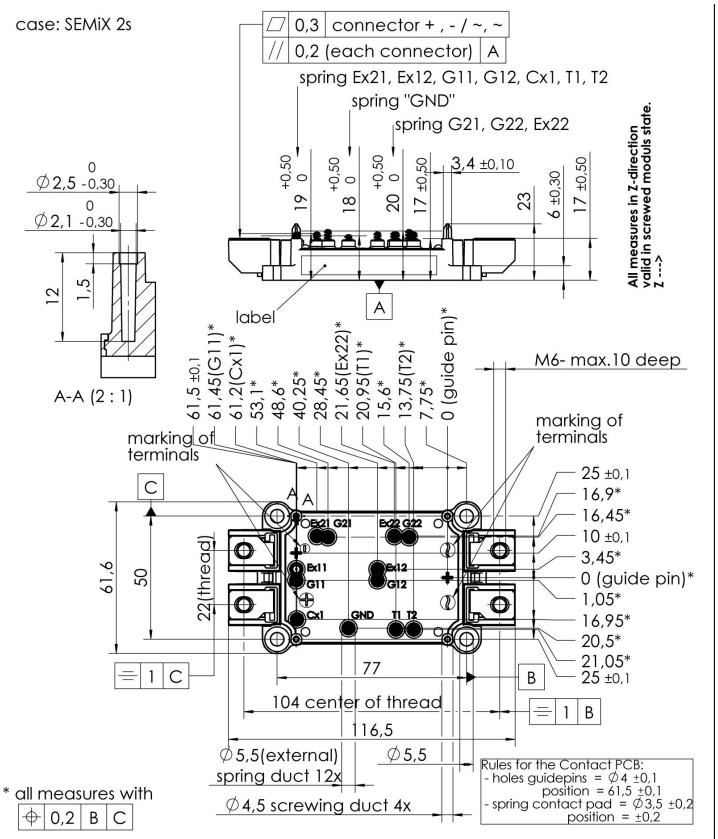


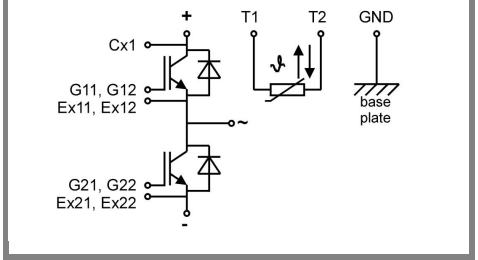

Fig. 12 Typ. CAL diode recovery charge

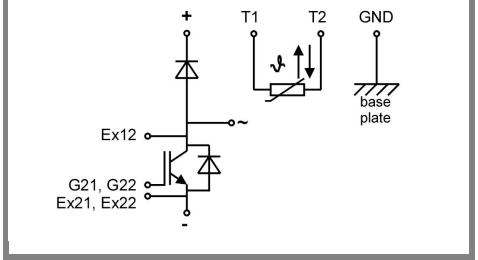
# SEMiX 302GB12T4s



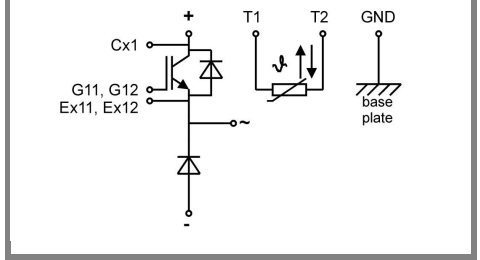

Case SEMiX 2s




Pinout GB




Pinout GAL




Pinout GAR