

SEMiX452GB126HDs



SEMiX® 2s

Trench IGBT Modules

SEMiX452GB126HDs

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 $T_C=125^\circ\text{C}$ max.
- Not for new design



GB

| Absolute Maximum Ratings | | | | |
|--------------------------|--|---------------------------|------------------|---------------|
| Symbol | Conditions | Values | Unit | |
| IGBT | | | | |
| V_{CES} | | 1200 | V | |
| I_C | $T_j = 150^\circ\text{C}$ | $T_c = 25^\circ\text{C}$ | 455 | A |
| | | $T_c = 80^\circ\text{C}$ | 319 | A |
| I_{Cnom} | | 300 | A | |
| I_{CRM} | $I_{CRM} = 2 \times I_{Cnom}$ | 600 | A | |
| V_{GES} | | -20 ... 20 | V | |
| t_{psc} | $V_{CC} = 600\text{ V}$ | $T_j = 125^\circ\text{C}$ | 10 | μs |
| | $V_{GE} \leq 20\text{ V}$ | | | |
| | $V_{CES} \leq 1200\text{ V}$ | | | |
| T_j | | -40 ... 150 | $^\circ\text{C}$ | |
| Inverse diode | | | | |
| I_F | $T_j = 150^\circ\text{C}$ | $T_c = 25^\circ\text{C}$ | 394 | A |
| | | $T_c = 80^\circ\text{C}$ | 272 | A |
| I_{Fnom} | | 300 | A | |
| I_{FRM} | $I_{FRM} = 2 \times I_{Fnom}$ | 600 | A | |
| I_{FSM} | $t_p = 10\text{ ms, sin } 180^\circ, T_j = 25^\circ\text{C}$ | 1900 | A | |
| T_j | | -40 ... 150 | $^\circ\text{C}$ | |
| Module | | | | |
| $I_{t(RMS)}$ | $T_{terminal} = 80^\circ\text{C}$ | 600 | A | |
| T_{stg} | | -40 ... 125 | $^\circ\text{C}$ | |
| V_{isol} | AC sinus 50Hz, $t = 1\text{ min}$ | 4000 | V | |

| Characteristics | | | | | |
|-----------------|--|---------------------------|------|-------|------------------|
| Symbol | Conditions | min. | typ. | max. | Unit |
| IGBT | | | | | |
| $V_{CE(sat)}$ | $I_C = 300\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel | $T_j = 25^\circ\text{C}$ | 1.7 | 2.1 | V |
| | | $T_j = 125^\circ\text{C}$ | 2.0 | 2.45 | V |
| V_{CE0} | | $T_j = 25^\circ\text{C}$ | 1 | 1.2 | V |
| | | $T_j = 125^\circ\text{C}$ | 0.9 | 1.1 | V |
| r_{CE} | $V_{GE} = 15\text{ V}$ | $T_j = 25^\circ\text{C}$ | 2.3 | 3.0 | $\text{m}\Omega$ |
| | | $T_j = 125^\circ\text{C}$ | 3.7 | 4.5 | $\text{m}\Omega$ |
| $V_{GE(th)}$ | $V_{GE}=V_{CE}, I_C = 12\text{ mA}$ | 5 | 5.8 | 6.5 | V |
| I_{CES} | $V_{GE} = 0\text{ V}$ $V_{CE} = 1200\text{ V}$ | $T_j = 25^\circ\text{C}$ | 0.1 | 0.3 | mA |
| | | $T_j = 125^\circ\text{C}$ | | | mA |
| C_{ies} | $V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$ | $f = 1\text{ MHz}$ | 21.5 | | nF |
| C_{oes} | | $f = 1\text{ MHz}$ | 1.13 | | nF |
| C_{res} | | $f = 1\text{ MHz}$ | 0.98 | | nF |
| Q_G | $V_{GE} = -8\text{ V} \dots +15\text{ V}$ | | 2400 | | nC |
| R_{Gint} | $T_j = 25^\circ\text{C}$ | | 2.50 | | Ω |
| $t_{d(on)}$ | $V_{CC} = 600\text{ V}$ $I_C = 300\text{ A}$ | $T_j = 125^\circ\text{C}$ | 280 | | ns |
| t_r | $V_{GE} = \pm 15\text{ V}$ | $T_j = 125^\circ\text{C}$ | 65 | | ns |
| E_{on} | $R_{Gon} = 2\ \Omega$ | $T_j = 125^\circ\text{C}$ | 35 | | mJ |
| $t_{d(off)}$ | $R_{Goff} = 2\ \Omega$ | $T_j = 125^\circ\text{C}$ | 630 | | ns |
| t_f | | $T_j = 125^\circ\text{C}$ | 130 | | ns |
| E_{off} | | $T_j = 125^\circ\text{C}$ | 45 | | mJ |
| $R_{th(j-c)}$ | per IGBT | | | 0.083 | K/W |

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| Characteristics | | | | | | |
|--------------------------|--|---------------------------|------|----------------|------|---------------|
| Symbol | Conditions | | min. | typ. | max. | Unit |
| Inverse diode | | | | | | |
| $V_F = V_{EC}$ | $I_F = 300\text{ A}$ $V_{GE} = 0\text{ V}$ chip | $T_j = 25^\circ\text{C}$ | | 1.6 | 1.80 | V |
| | | $T_j = 125^\circ\text{C}$ | | 1.6 | 1.8 | V |
| V_{F0} | | $T_j = 25^\circ\text{C}$ | 0.9 | 1 | 1.1 | V |
| | | $T_j = 125^\circ\text{C}$ | 0.7 | 0.8 | 0.9 | V |
| r_F | | $T_j = 25^\circ\text{C}$ | 1.7 | 2.0 | 2.3 | m Ω |
| | | $T_j = 125^\circ\text{C}$ | 2.3 | 2.7 | 3.0 | m Ω |
| I_{RRM} | $I_F = 300\text{ A}$ | $T_j = 125^\circ\text{C}$ | | 375 | | A |
| Q_{rr} | $di/dt_{off} = 6200\text{ A}/\mu\text{s}$ | $T_j = 125^\circ\text{C}$ | | 75 | | μC |
| E_{rr} | $V_{GE} = -15\text{ V}$ $V_{CC} = 600\text{ V}$ | $T_j = 125^\circ\text{C}$ | | 33 | | mJ |
| $R_{th(j-c)}$ | per diode | | | | 0.15 | K/W |
| Module | | | | | | |
| L_{CE} | | | | 18 | | nH |
| $R_{CC'+EE'}$ | res., terminal-chip | $T_C = 25^\circ\text{C}$ | | 0.7 | | m Ω |
| | | $T_C = 125^\circ\text{C}$ | | 1 | | m Ω |
| $R_{th(c-s)}$ | per module | | | 0.045 | | K/W |
| M_s | to heat sink (M5) | | 3 | | 5 | Nm |
| M_t | | to terminals (M6) | 2.5 | | 5 | Nm |
| | | | | | | Nm |
| w | | | | | 250 | g |
| Temperatur Sensor | | | | | | |
| R_{100} | $T_C=100^\circ\text{C}$ ($R_{25}=5\text{ k}\Omega$) | | | $493 \pm 5\%$ | | Ω |
| $B_{100/125}$ | $R(T)=R_{100}\exp[B_{100/125}(1/T-1/T_{100})]$; T[K]; | | | $3550 \pm 2\%$ | | K |



GB

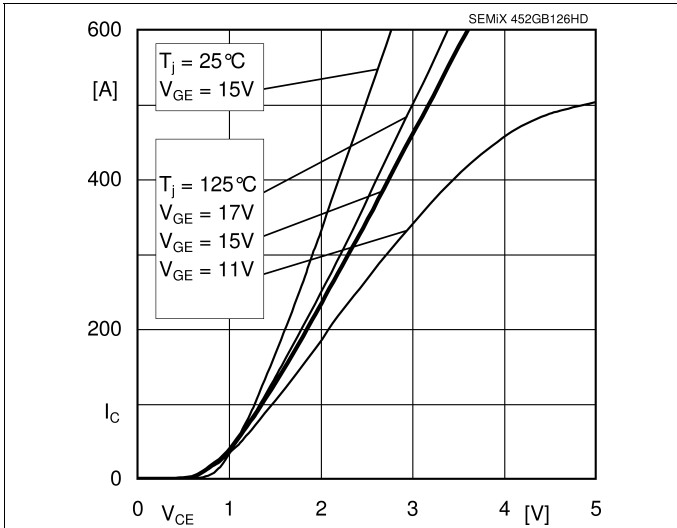


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

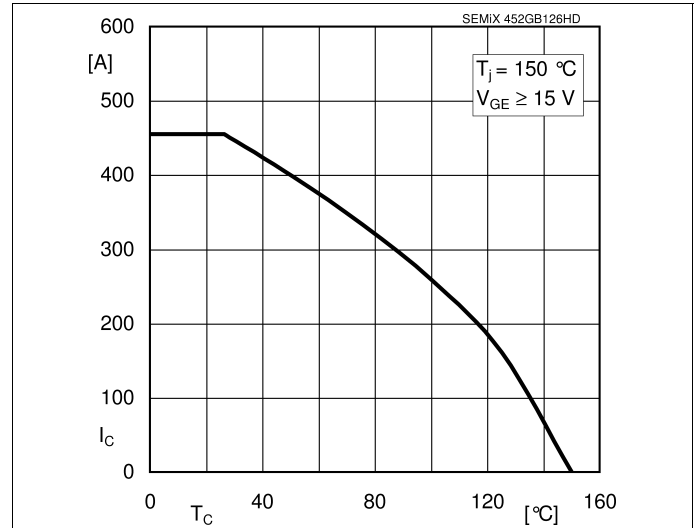


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

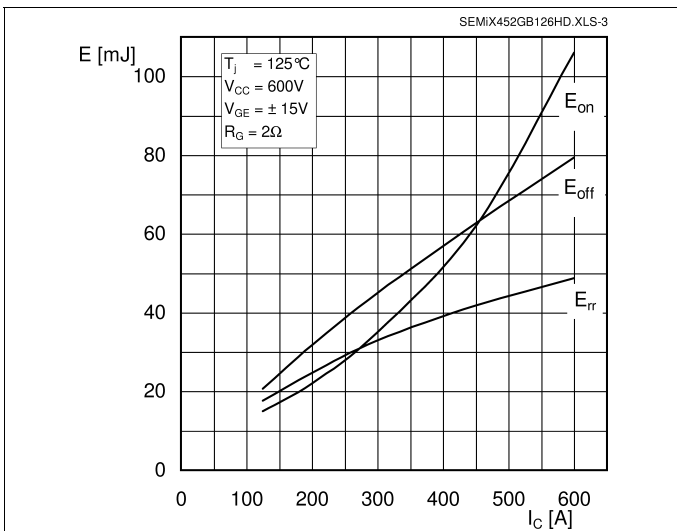


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

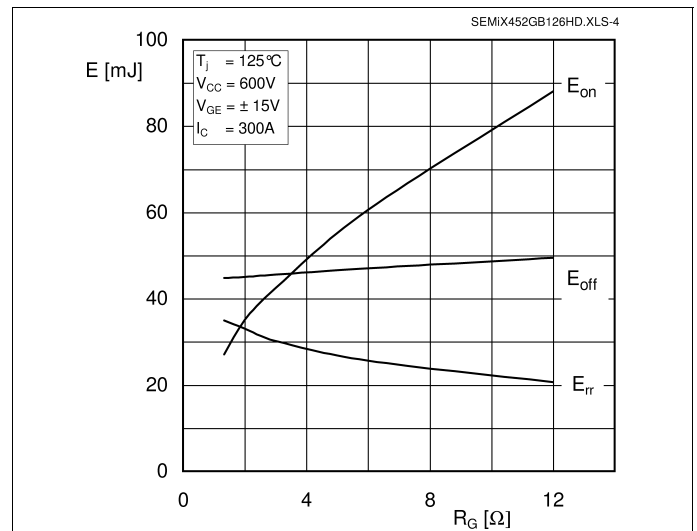


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

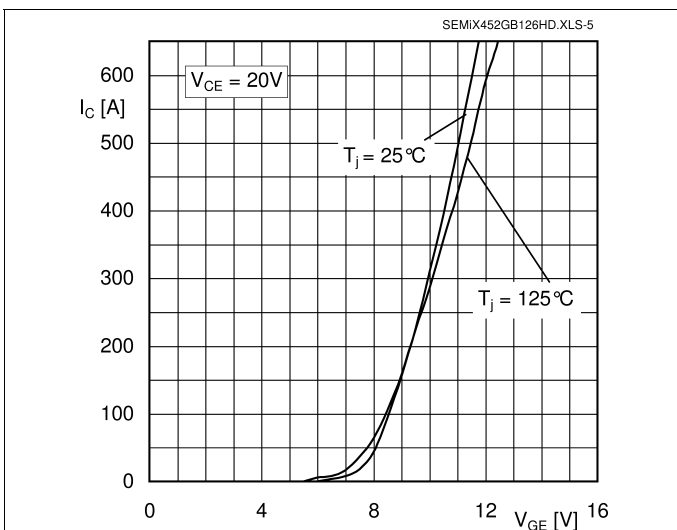


Fig. 5: Typ. transfer characteristic

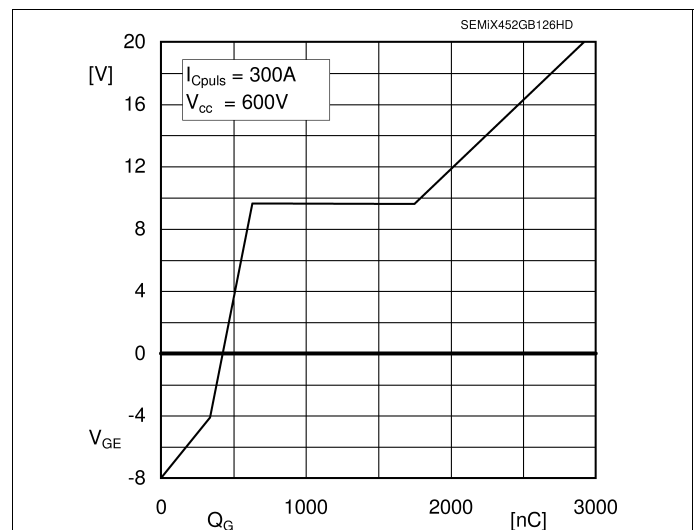
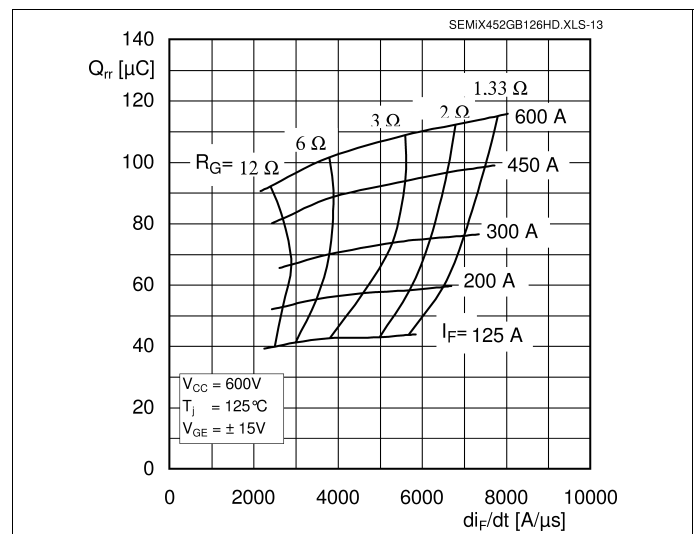
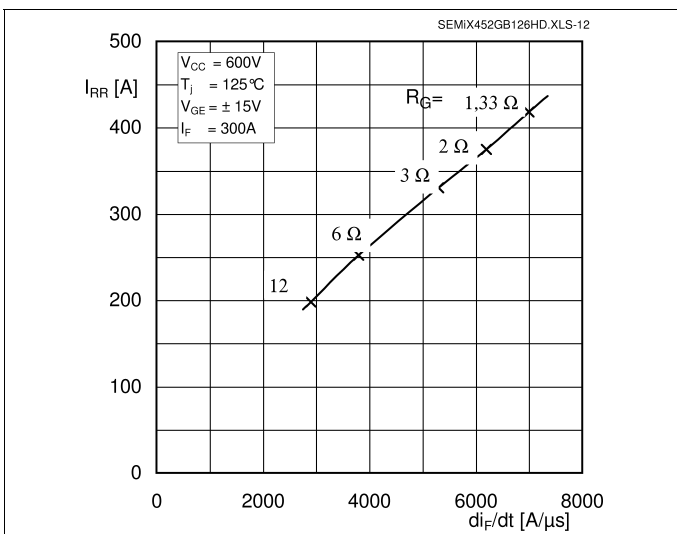
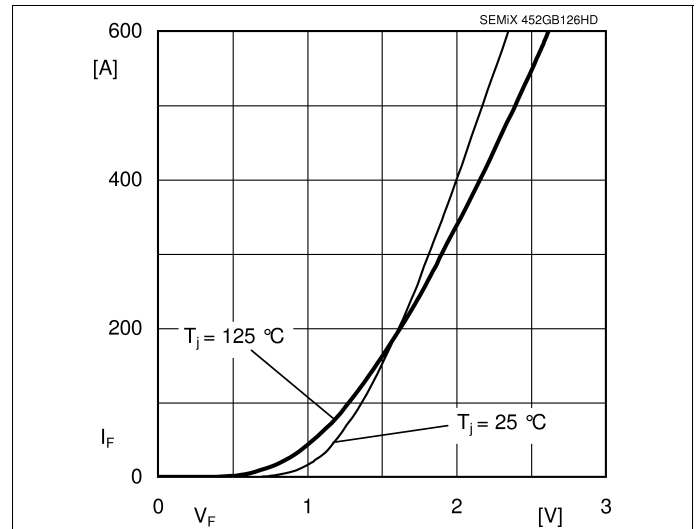
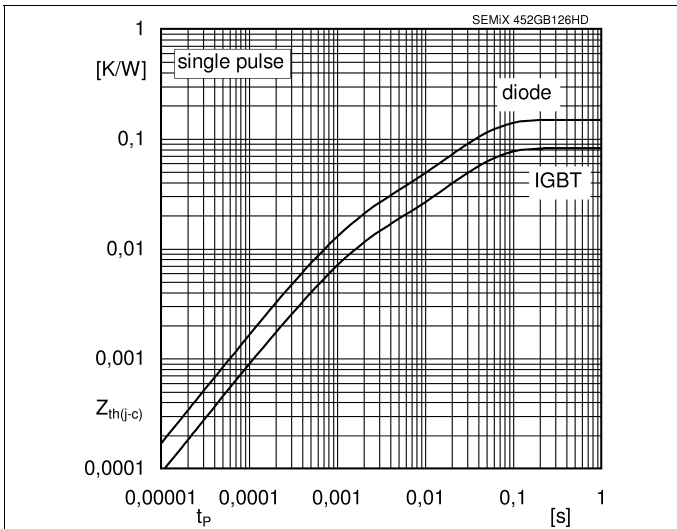
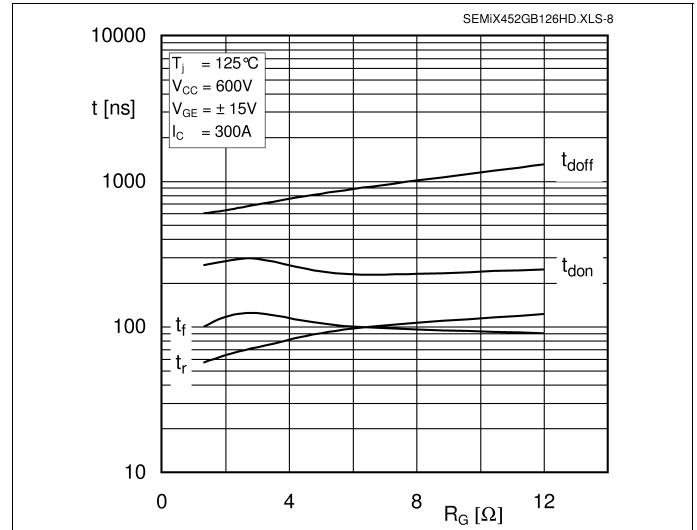
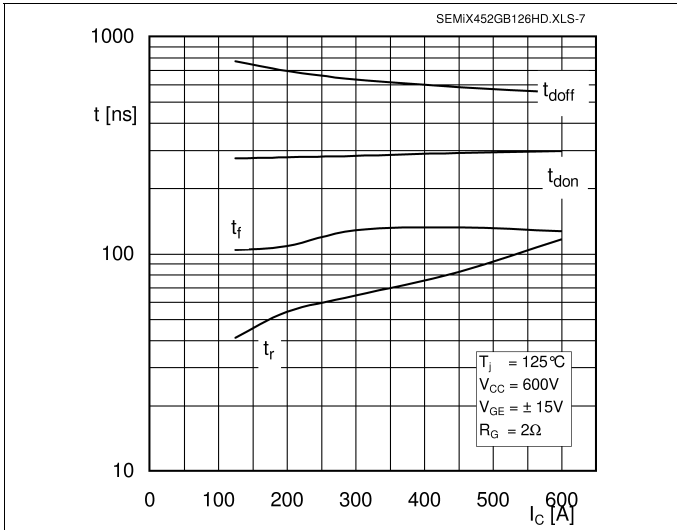


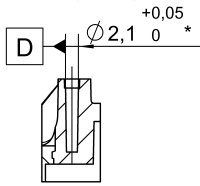
Fig. 6: Typ. gate charge characteristic



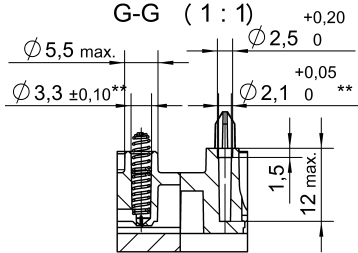
SEMiX452GB126HDs

Case: SEMiX 2s

screw duct
(left top) :
F-F (1:1)

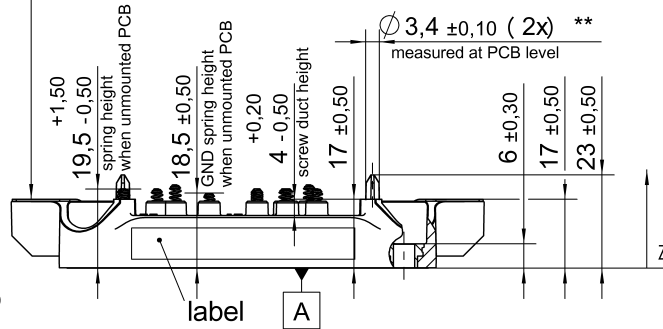


screw duct (4x)
spring duct (12x) :
G-G (1:1)



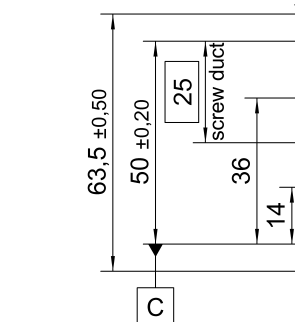
| | | |
|--|-----|---------------------|
| | 0,3 | connector 1-2 / 3-4 |
| | 0,2 | each connector A |

general tolerance:
ISO 2768-mK
ISO 8015

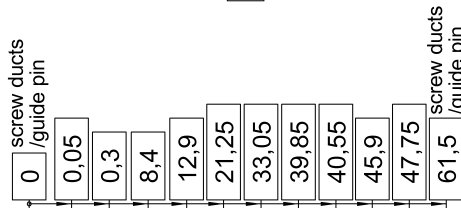
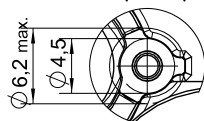


All measures in Z-direction
valid when mounted to heat sink

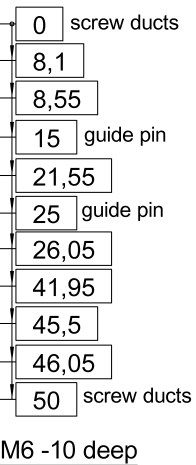
marking of
terminals



screw duct
top view (4x) :
J (2:1)



marking of
terminals



*screw duct left / top with

| | | | | |
|--|------------|---|---|---|
| | ϕ 0,2 | A | B | C |
|--|------------|---|---|---|

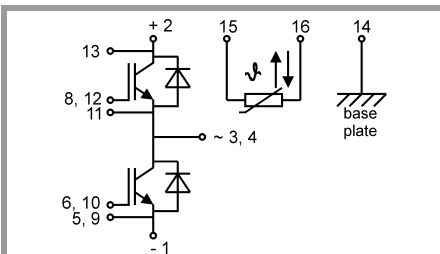
**screw ducts / guide pins / spring ducts with

| | | | | |
|--|------------|---|---|---|
| | ϕ 0,2 | A | D | C |
|--|------------|---|---|---|

Rules for the contact PCB:

- holes guidepins = ϕ 4 ± 0,1 / position tolerance ± 0,1
- holes for screws = ϕ 2,9 ± 0,1 / position tolerance ± 0,1
- spring contact pad = ϕ 3,6 ± 0,1 / position tolerance ± 0,1

SEMiX 2s



spring configuration

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

* The specifications of our components may not be considered as an assurance of component characteristics. Components have to be tested for the respective application. Adjustments may be necessary. The use of SEMIKRON products in life support appliances and systems is subject to prior specification and written approval by SEMIKRON. We therefore strongly recommend prior consultation of our staff.