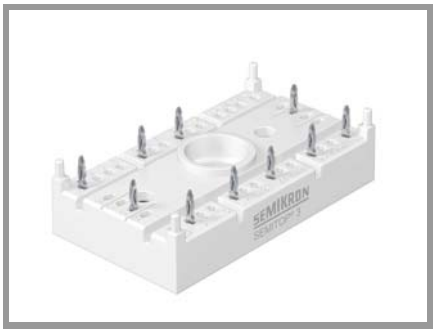
# SK 25 GD 12T4 ETp



**SEMITOP® 3 Press-Fit**

Sixpack Open Emitter

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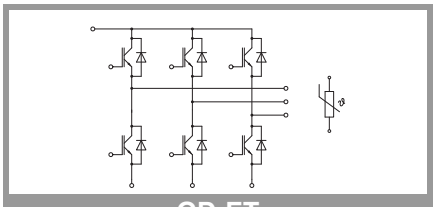
### Features*

- One screw mounting module
- Optimized design for superior thermal performances
- Low inductive design
- Compatible with other SEMITOP® Press-Fit types
- 1200V Trench IGBT (T4)
- Robust and soft switching CAL4F diode technology
- Integrated NTC temperature sensor
- UL recognized, file no. E 63 532

### Typical Applications

- Motor Drives
- Servo Drives
- Air Conditioning
- Auxiliary Inverters
- UPS



**GD-ET**

| Absolute Maximum Ratings | | | | |
|---|---|---|---|---|
| **Symbol** | **Conditions** | | **Values** | **Unit** |
| **IGBT 1** | | | | |
| $V_{CES}$ | $T_j$ = 25 °C | | 1200 | V |
| $I_C$ | $T_j$ = 150 °C | $T_s$ = 25 °C | 32 | A |
| | | $T_s$ = 70 °C | 24 | A |
| $I_C$ | $T_j$ = 175 °C | $T_s$ = 25 °C | 35 | A |
| | | $T_s$ = 70 °C | 29 | A |
| $I_{Cnom}$ | | | 25 | A |
| $I_{CRM}$ | | | 75 | A |
| $V_{GES}$ | | | -20 ... 20 | V |
| $t_{psc}$ | $V_{CC}$ = 800 V<br>$V_{GE} \leq$ 15 V<br>$V_{CES} \leq$ 1200 V | $T_j$ = 150 °C | 10 | µs |
| $T_j$ | | | -40 ... 175 | °C |

| Absolute Maximum Ratings | | | | |
|---|---|---|---|---|
| **Symbol** | **Conditions** | | **Values** | **Unit** |
| **Diode 1** | | | | |
| $V_{RRM}$ | $T_j$ = 25 °C | | 1200 | V |
| $I_F$ | $T_j$ = 150 °C | $T_s$ = 25 °C | 25 | A |
| | | $T_s$ = 70 °C | 19 | A |
| $I_F$ | $T_j$ = 175 °C | $T_s$ = 25 °C | 28 | A |
| | | $T_s$ = 70 °C | 22 | A |
| $I_{FRM}$ | | | 50 | A |
| $I_{FSM}$ | 10 ms, sin 180°, $T_j$ = 150 °C | | 100 | A |
| $T_j$ | | | -40 ... 175 | °C |

| Absolute Maximum Ratings | | | |
|---|---|---|---|
| **Symbol** | **Conditions** | **Values** | **Unit** |
| **Module** | | | |
| $I_{t(RMS)}$ | $\Delta T_{terminal}$ at PCB joint = 30 K, per pin | 35 | A |
| $T_{stg}$ | module without TIM | -40 ... 125 | °C |
| $V_{isol}$ | AC, sinusoidal, t = 1 min | 2500 | V |

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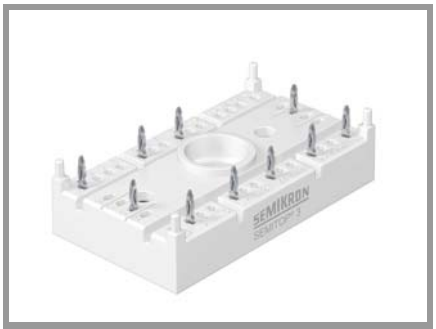

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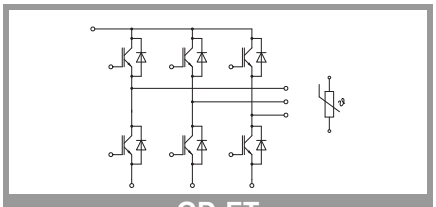

**GD-ET**

**Characteristics**

| Symbol | Conditions | | min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|
| **IGBT 1** | | | | | | |
| $V_{CE(sat)}$ | $I_C$ = 25 A<br>$V_{GE}$ = 15 V<br>chiplevel | $T_j$ = 25 °C | | 1.85 | 2.10 | V |
| | | $T_j$ = 150 °C | | 2.25 | 2.45 | V |
| $V_{CE0}$ | chiplevel | $T_j$ = 25 °C | | 0.80 | 0.90 | V |
| | | $T_j$ = 150 °C | | 0.70 | 0.80 | V |
| $r_{CE}$ | $V_{GE}$ = 15 V<br>chiplevel | $T_j$ = 25 °C | | 42 | 48 | mΩ |
| | | $T_j$ = 150 °C | | 62 | 66 | mΩ |
| $V_{GE(th)}$ | $V_{GE}$ = $V_{CE}$, $I_C$ = 0.85 mA | | 5.3 | 5.8 | 6.3 | V |
| $I_{CES}$ | $V_{GE}$ = 0 V<br>$V_{CE}$ = 1200 V | $T_j$ = 25 °C | | | 1 | mA |
| | | | | - | | mA |
| $C_{ies}$ | $V_{CE}$ = 25 V<br>$V_{GE}$ = 0 V | f = 1 MHz | | 1.45 | | nF |
| $C_{oes}$ | | f = 1 MHz | | 0.12 | | nF |
| $C_{res}$ | | f = 1 MHz | | 0.05 | | nF |
| $Q_G$ | $V_{GE}$ = -7V...+15V | | | 142 | | nC |
| $R_{Gint}$ | $T_j$ = 25 °C | | | 0 | | Ω |
| $t_{d(on)}$ | $V_{CC}$ = 600 V<br>$I_C$ = 25 A<br>$V_{GE\ neg}$ = -7 V<br>$V_{GE\ pos}$ = 15 V<br>$R_{G\ on}$ = 19 Ω<br>$R_{G\ off}$ = 19 Ω<br>$di/dt_{on}$ = 2825 A/µs<br>$di/dt_{off}$ = 1685 A/µs | $T_j$ = 150 °C | | 22 | | ns |
| $t_r$ | | $T_j$ = 150 °C | | 19.5 | | ns |
| $E_{on}$ | | $T_j$ = 150 °C | | 2.27 | | mJ |
| $t_{d(off)}$ | | $T_j$ = 150 °C | | 288 | | ns |
| $t_f$ | | $T_j$ = 150 °C | | 77.5 | | ns |
| $E_{off}$ | | $T_j$ = 150 °C | | 2.7 | | mJ |
| $R_{th(j-s)}$ | per IGBT, $\lambda_{paste}$=0.8 W/(mK) | | | 1.31 | | K/W |

**Characteristics**

| Symbol | Conditions | | min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|
| **Diode 1** | | | | | | |
| $V_F$ | $I_F$ = 25 A | $T_j$ = 25 °C | | 2.41 | 2.74 | V |
| | chiplevel | $T_j$ = 150 °C | | 2.45 | 2.79 | V |
| $V_{F0}$ | chiplevel | $T_j$ = 25 °C | | 1.30 | 1.50 | V |
| | | $T_j$ = 150 °C | | 0.90 | 1.10 | V |
| $r_F$ | chiplevel | $T_j$ = 25 °C | | 44 | 50 | mΩ |
| | | $T_j$ = 150 °C | | 62 | 68 | mΩ |
| $I_{RRM}$ | $I_F$ = 25 A<br>$di/dt_{off}$ = 2825 A/µs<br>$V_{GE}$ = -7 V<br>$V_{CC}$ = 600 V | $T_j$ = 150 °C | | 31.5 | | A |
| $Q_{rr}$ | | $T_j$ = 150 °C | | 1.15 | | µC |
| $E_{rr}$ | | $T_j$ = 150 °C | | 1.28 | | mJ |
| $R_{th(j-s)}$ | per diode, $\lambda_{paste}$=0.8 W/(mK) | | | 1.91 | | K/W |

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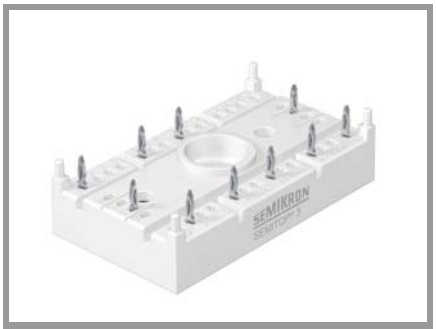

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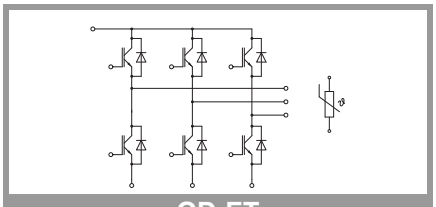

**GD-ET**

| Characteristics | | | | | |
|---|---|---|---|---|---|
| **Symbol** | **Conditions** | **min.** | **typ.** | **max.** | **Unit** |
| **Module** | | | | | |
| $M_s$ | to heatsink | 2.25 | | 2.5 | Nm |
| w | weight | | 30 | | g |

| Characteristics | | | | | |
|---|---|---|---|---|---|
| **Symbol** | **Conditions** | **min.** | **typ.** | **max.** | **Unit** |
| **Temperature Sensor** | | | | | |
| $R_{100}$ | $T_r$ = 100 °C | | 493 ± 5% | | Ω |
| $B_{100/125}$ | $R_{(T)}=R_{100}\exp[B_{100/125}(1/T-1/T_{100})]$; T[K]; | | 3550 ±2% | | K |

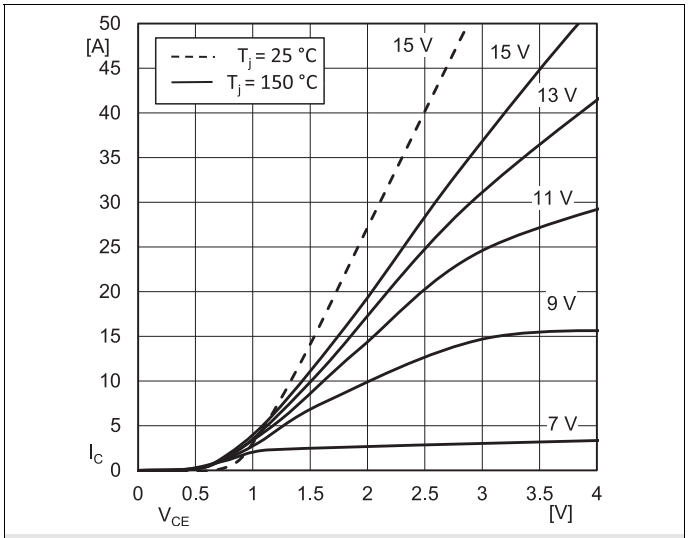


Fig. 1: Typ. IGBT1 output characteristic, incl. $R_{CC'+EE'}$

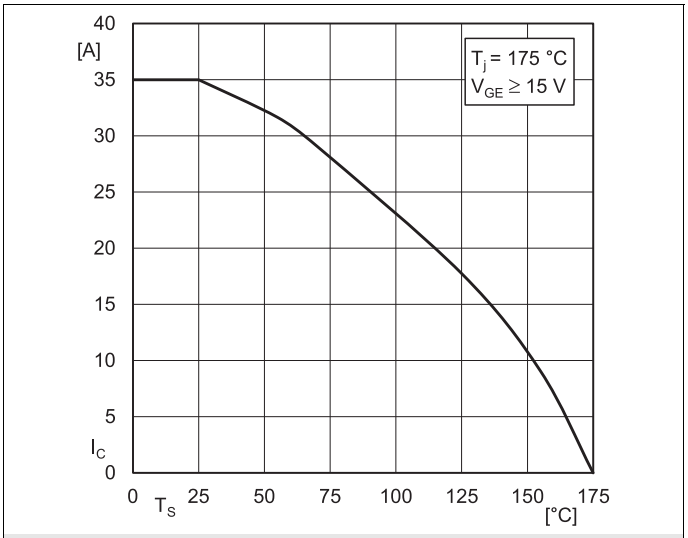


Fig. 2: Typ. rated current vs. temperature $I_C = f(T_S)$

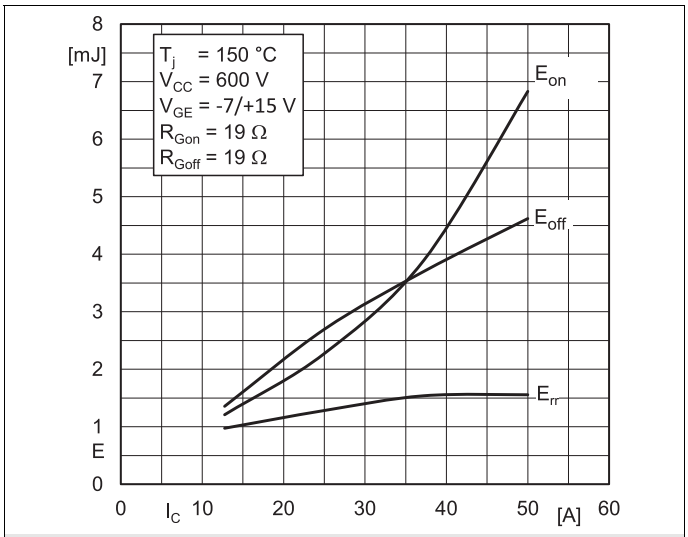


Fig. 3: Typ. turn-on /-off energy = f ($I_C$)

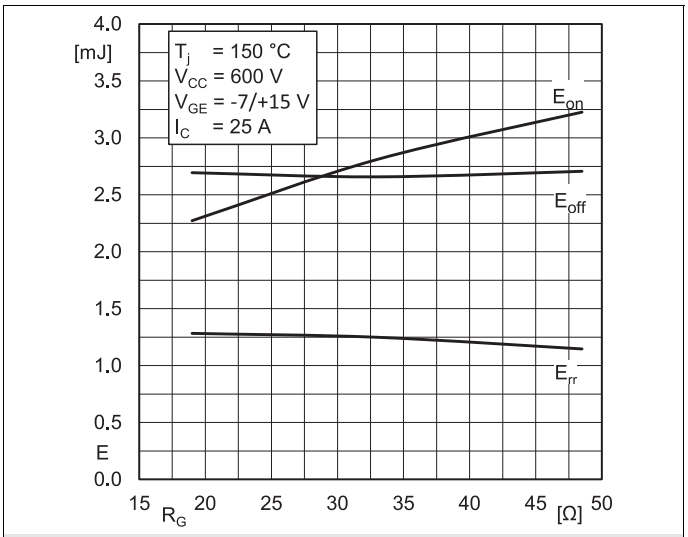


Fig. 4: Typ. turn-on /-off energy = f ($R_G$)

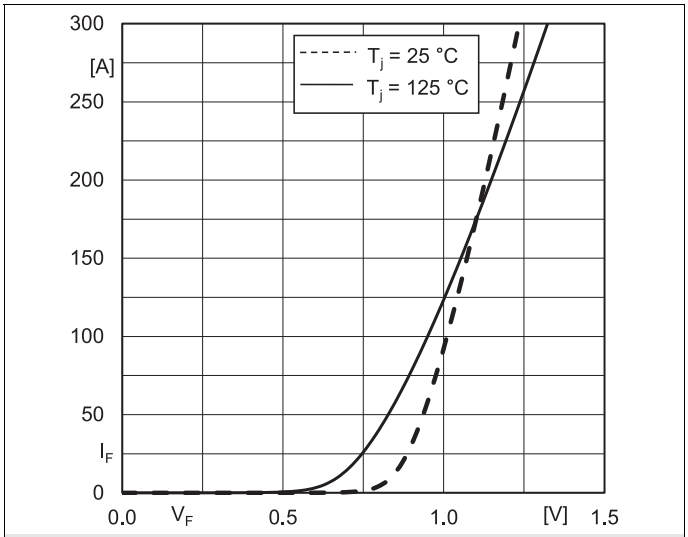


Fig. 5: Typ. IGBT1 transfer characteristic

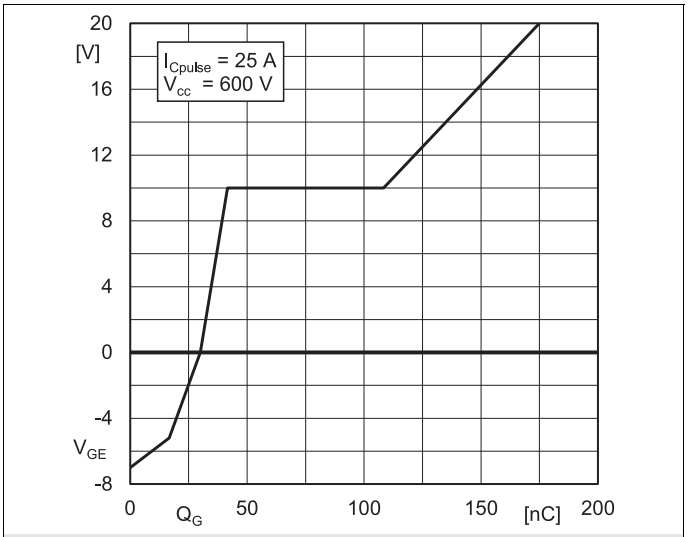


Fig. 6: Typ. gate charge characteristic

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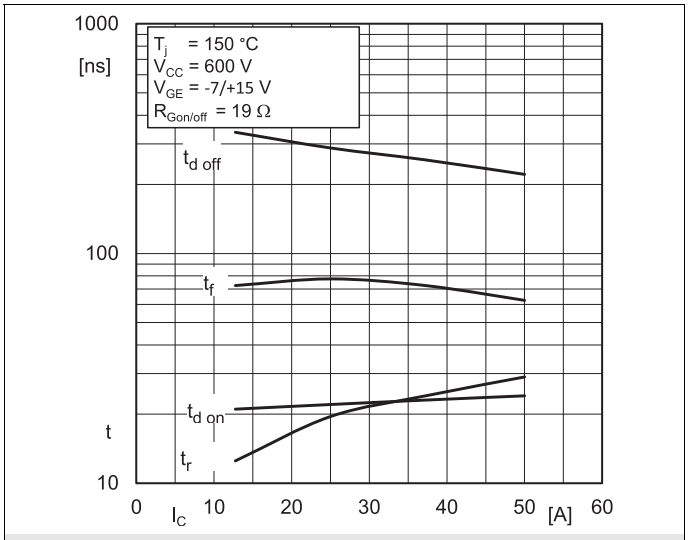



Fig. 7: Typ. switching times vs. $I_C$

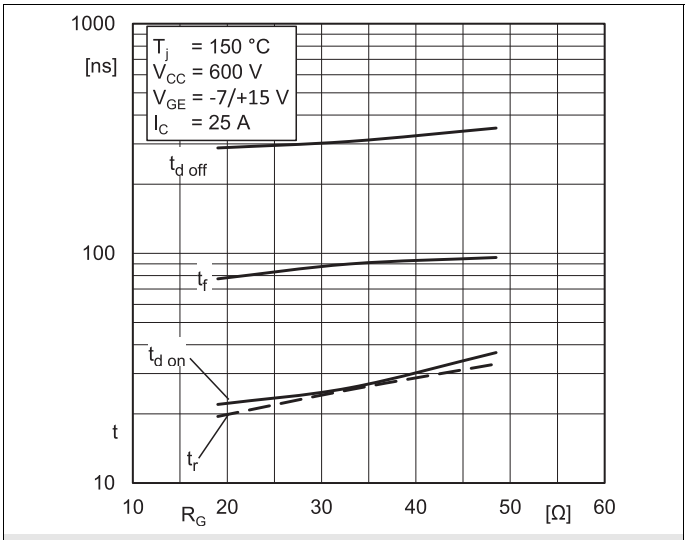



Fig. 8: Typ. switching times vs. gate resistor $R_G$

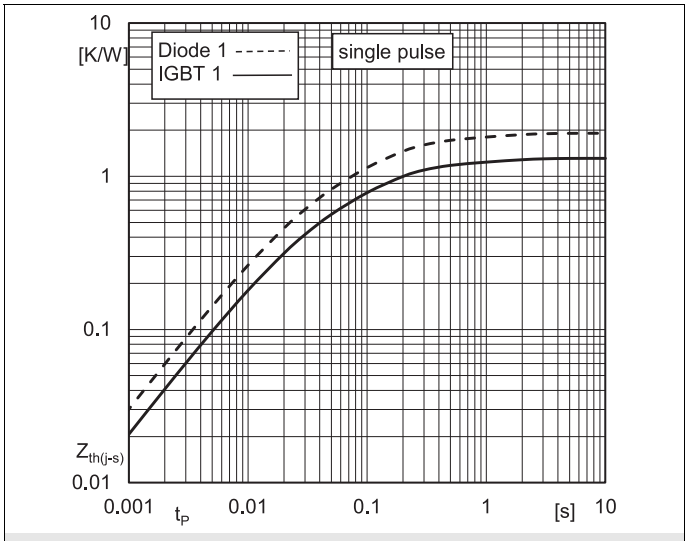



Fig. 9: Typ. transient thermal impedance

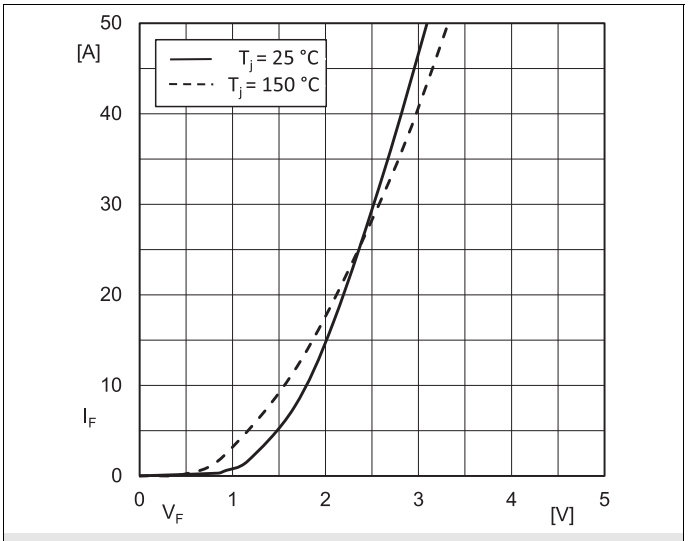
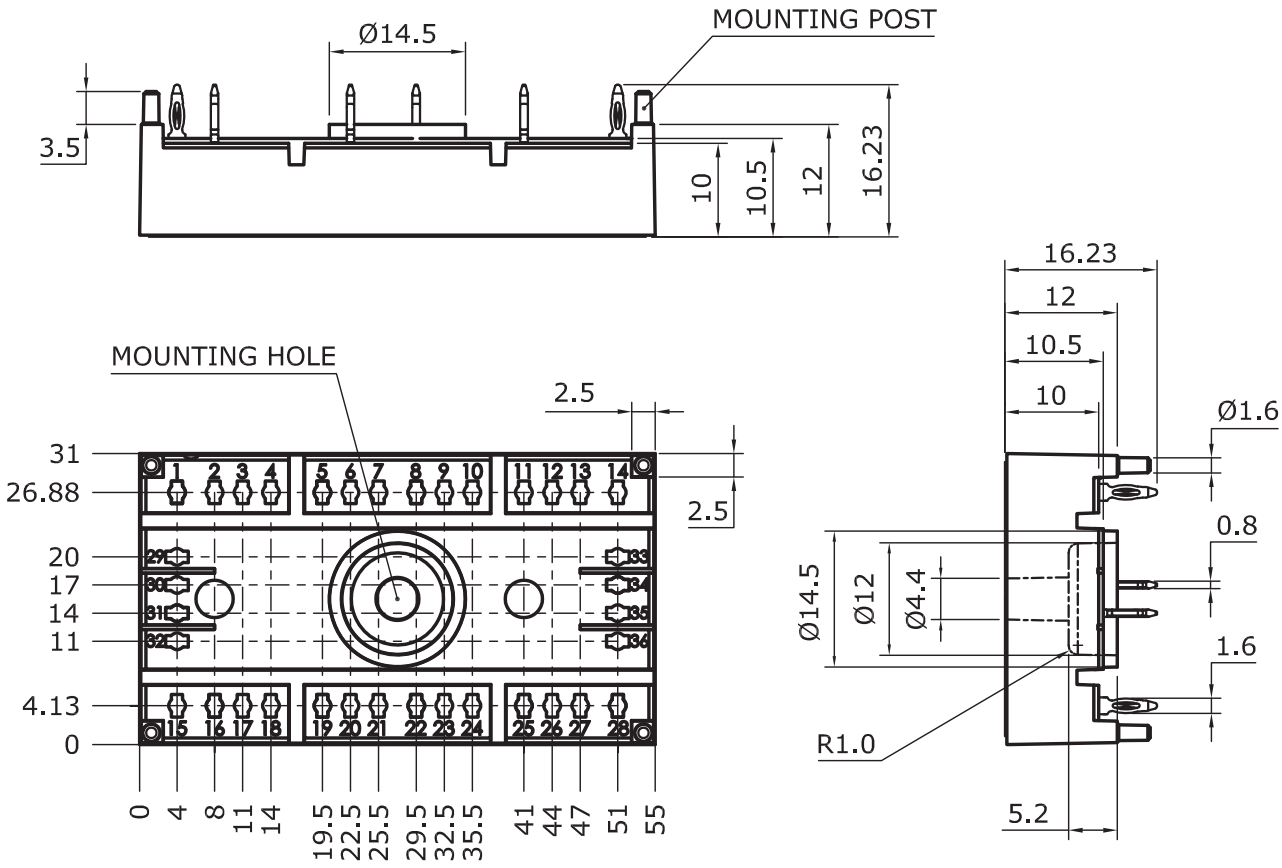



Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

Dimensions: mm
Tolerance system: ISO 2768-m




Suggested drilled hole diameter for terminal pins in the circuit board:
- refer Mounting Instruction SEMITOP® Classic

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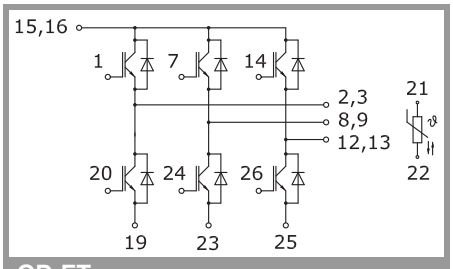
**SEMITOP 3 Press-Fit**




**GD-ET**

This is an electrostatic discharge sensitive device (ESDS) due to international standard IEC 61340.

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