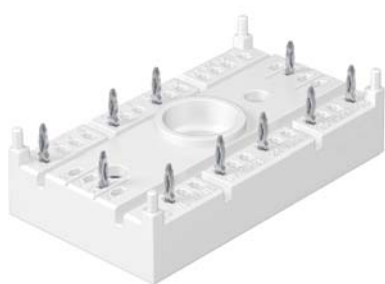


# SK25GD12F4ETp



SEMITOP® 3 Press-Fit

## Sixpack Open Emitter

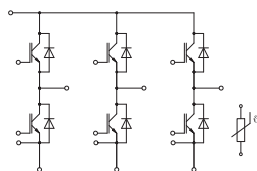
### SK25GD12F4ETp

#### Features\*

- One screw mounting module
- Solder free mounting with Press-Fit terminals
- Fully compatible with other SEMITOP® Press-Fit types
- Trench4 IGBT technology
- CAL4F technology FWD
- Integrated NTC temperature sensor
- UL recognized, file no. E 63 532

#### Typical Applications

- Motor drives
- Servo drives
- Air conditioning
- Auxiliary Inverters
- UPS



GD-ET

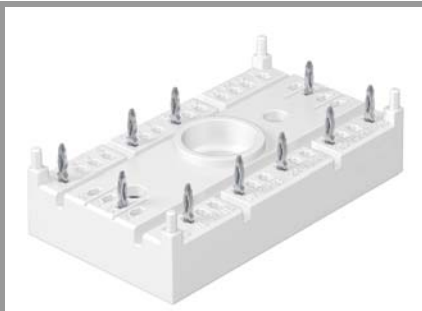
#### Absolute Maximum Ratings

| Symbol              | Conditions                                                                     |                         | Values      | Unit |
|---------------------|--------------------------------------------------------------------------------|-------------------------|-------------|------|
| Inverter - IGBT     |                                                                                |                         |             |      |
| V <sub>CES</sub>    | T <sub>j</sub> = 25 °C                                                         |                         | 1200        | V    |
| I <sub>C</sub>      | P12                                                                            | T <sub>s</sub> = 70 °C  | 25          | A    |
|                     | T <sub>j</sub> = 175 °C                                                        | T <sub>s</sub> = 100 °C | 20          | A    |
| I <sub>C</sub>      | HPTP                                                                           | T <sub>s</sub> = 70 °C  | 29          | A    |
|                     | T <sub>j</sub> = 175 °C                                                        | T <sub>s</sub> = 100 °C | 23          | A    |
| I <sub>Cnom</sub>   |                                                                                |                         | 25          | A    |
| I <sub>CRM</sub>    |                                                                                |                         | 75          | A    |
| V <sub>GES</sub>    |                                                                                |                         | -20 ... 20  | V    |
| t <sub>psc</sub>    | V <sub>CC</sub> = 800 V<br>V <sub>GE</sub> ≤ 15 V<br>V <sub>CES</sub> ≤ 1200 V | T <sub>j</sub> = 150 °C | 10          | μs   |
| T <sub>j</sub>      |                                                                                |                         | -40 ... 175 | °C   |
| Inverse - Diode     |                                                                                |                         |             |      |
| V <sub>RRM</sub>    | T <sub>j</sub> = 25 °C                                                         |                         | 1200        | V    |
| I <sub>F</sub>      | P12                                                                            | T <sub>s</sub> = 70 °C  | 18          | A    |
|                     | T <sub>j</sub> = 175 °C                                                        | T <sub>s</sub> = 100 °C | 14          | A    |
| I <sub>F</sub>      | HPTP                                                                           | T <sub>s</sub> = 70 °C  | 19          | A    |
|                     | T <sub>j</sub> = 175 °C                                                        | T <sub>s</sub> = 100 °C | 16          | A    |
| I <sub>FRM</sub>    |                                                                                |                         | 30          | A    |
| I <sub>FSM</sub>    | t <sub>p</sub> = 10 ms, sin 180°, T <sub>j</sub> = 150 °C                      |                         | 65          | A    |
| T <sub>j</sub>      |                                                                                |                         | -40 ... 175 | °C   |
| Module              |                                                                                |                         |             |      |
| I <sub>t(RMS)</sub> | , ΔT <sub>terminal</sub> at PCB joint = 30 K, per pin                          |                         | 35          | A    |
| T <sub>stg</sub>    | module without TIM                                                             |                         | -40 ... 125 | °C   |
| V <sub>isol</sub>   | AC, sinusoidal, t = 1 min                                                      |                         | 2500        | V    |

#### Characteristics

| Symbol                 | Conditions                                                                             | min.                  | typ. | max. | Unit             |
|------------------------|----------------------------------------------------------------------------------------|-----------------------|------|------|------------------|
| <b>Inverter - IGBT</b> |                                                                                        |                       |      |      |                  |
| $V_{CE(sat)}$          | $I_C = 25\text{ A}$<br>$V_{GE} = 15\text{ V}$<br>chiplevel                             | $T_j = 25\text{ °C}$  | 2.05 | 2.42 | V                |
|                        |                                                                                        | $T_j = 150\text{ °C}$ | 2.59 |      | V                |
| $V_{CE0}$              | chiplevel                                                                              | $T_j = 25\text{ °C}$  | 1.10 | 1.28 | V                |
|                        |                                                                                        | $T_j = 150\text{ °C}$ | 0.95 |      | V                |
| $r_{CE}$               | $V_{GE} = 15\text{ V}$<br>chiplevel                                                    | $T_j = 25\text{ °C}$  | 38   | 46   | $\text{m}\Omega$ |
|                        |                                                                                        | $T_j = 150\text{ °C}$ | 66   |      | $\text{m}\Omega$ |
| $V_{GE(th)}$           | $V_{GE} = V_{CE}, I_C = 0.85\text{ mA}$                                                | 5.2                   | 5.8  | 6.4  | V                |
| $I_{CES}$              | $V_{GE} = 0\text{ V}, V_{CE} = 1200\text{ V}, T_j = 25\text{ °C}$                      |                       |      | 1    | mA               |
| $C_{ies}$              | $V_{CE} = 25\text{ V}$<br>$V_{GE} = 0\text{ V}$                                        | $f = 1\text{ MHz}$    | 1.4  |      | nF               |
| $C_{oes}$              |                                                                                        | $f = 1\text{ MHz}$    | 0.12 |      | nF               |
| $C_{res}$              |                                                                                        | $f = 1\text{ MHz}$    | 0.09 |      | nF               |
| $Q_G$                  | $V_{GE} = -15\text{ V} \dots +15\text{ V}$                                             |                       | 201  |      | nC               |
| $R_{Gint}$             | $T_j = 25\text{ °C}$                                                                   |                       | 0    |      | $\Omega$         |
| $t_{d(on)}$            | $V_{CC} = 600\text{ V}$                                                                | $T_j = 150\text{ °C}$ | 9    |      | ns               |
| $t_r$                  | $I_C = 25\text{ A}$<br>$R_{Gon} = 8.2\text{ }\Omega$<br>$R_{Goff} = 8.2\text{ }\Omega$ | $T_j = 150\text{ °C}$ | 18.1 |      | ns               |
|                        |                                                                                        | $T_j = 150\text{ °C}$ | 1.6  |      | mJ               |
| $E_{on}$               | $di/dt_{on} = 1100\text{ A}/\mu\text{s}$                                               | $T_j = 150\text{ °C}$ | 223  |      | ns               |
| $t_{d(off)}$           | $di/dt_{off} = 330\text{ A}/\mu\text{s}$                                               | $T_j = 150\text{ °C}$ | 60   |      | ns               |
| $t_f$                  | $dv/dt = 5029\text{ V}/\mu\text{s}$                                                    | $T_j = 150\text{ °C}$ |      |      |                  |
| $E_{off}$              | $V_{GE} = +15/-15\text{ V}$                                                            | $T_j = 150\text{ °C}$ | 1.76 |      | mJ               |
| $R_{th(j-s)}$          | per IGBT, P12 (Reference)                                                              |                       | 1.4  |      | K/W              |
| $R_{th(j-s)}$          | per IGBT, HPTP                                                                         |                       | 1.1  |      | K/W              |

# SK25GD12F4ETp



SEMITOP® 3 Press-Fit

## Sixpack Open Emitter

### SK25GD12F4ETp

#### Features\*

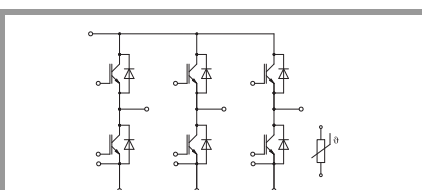
- One screw mounting module
- Solder free mounting with Press-Fit terminals
- Fully compatible with other SEMITOP® Press-Fit types
- Trench4 IGBT technology
- CAL4F technology FWD
- Integrated NTC temperature sensor
- UL recognized, file no. E 63 532

#### Typical Applications

- Motor drives
- Servo drives
- Air conditioning
- Auxiliary Inverters
- UPS

| Characteristics                  |                                                    |                         |      |      |      |      |
|----------------------------------|----------------------------------------------------|-------------------------|------|------|------|------|
| Symbol                           | Conditions                                         |                         | min. | typ. | max. | Unit |
| Inverse - Diode                  |                                                    |                         |      |      |      |      |
| V <sub>F</sub> = V <sub>EC</sub> | I <sub>F</sub> = 15 A                              | T <sub>j</sub> = 25 °C  |      | 2.38 | 2.71 | V    |
|                                  | chipelevel                                         | T <sub>j</sub> = 150 °C |      | 2.44 |      | V    |
| V <sub>F0</sub>                  | chipelevel                                         | T <sub>j</sub> = 25 °C  |      | 1.30 | 1.50 | V    |
|                                  |                                                    | T <sub>j</sub> = 150 °C |      | 0.90 |      | V    |
| r <sub>F</sub>                   | chipelevel                                         | T <sub>j</sub> = 25 °C  |      | 72   | 81   | mΩ   |
|                                  |                                                    | T <sub>j</sub> = 150 °C |      | 103  |      | mΩ   |
| I <sub>RRM</sub>                 | I <sub>F</sub> = 25 A                              | T <sub>j</sub> = 150 °C |      | 18.8 |      | A    |
| Q <sub>rr</sub>                  | V <sub>GE</sub> = -15 V<br>V <sub>CC</sub> = 600 V | T <sub>j</sub> = 150 °C |      | 4.1  |      | μC   |
| E <sub>rr</sub>                  | di/dt <sub>off</sub> = 1100 A/μs                   | T <sub>j</sub> = 150 °C |      | 1.6  |      | mJ   |
| R <sub>th(j-s)</sub>             | per Diode, P12 (Reference)                         |                         |      | 2.1  |      | K/W  |
| R <sub>th(j-s)</sub>             | per Diode, HPTP                                    |                         |      | 1.8  |      | K/W  |
| Module                           |                                                    |                         |      |      |      |      |
| L <sub>CE</sub>                  |                                                    |                         |      | -    |      | nH   |
| M <sub>s</sub>                   | to heatsink                                        |                         | 2.25 |      | 2.5  | Nm   |
| w                                |                                                    |                         |      | 30   |      | g    |

| Characteristics    |                                                                               |          |      |      |      |
|--------------------|-------------------------------------------------------------------------------|----------|------|------|------|
| Symbol             | Conditions                                                                    | min.     | typ. | max. | Unit |
| Temperature Sensor |                                                                               |          |      |      |      |
| R <sub>100</sub>   | T <sub>c</sub> =100°C (R <sub>25</sub> =5 kΩ)                                 | 493 ± 5% |      |      | Ω    |
| B <sub>25/85</sub> | R <sub>(T)</sub> =R <sub>25</sub> *exp[B <sub>25/85</sub> *(1/T-1/298)], T[K] | 3420     |      |      | K    |



GD-ET

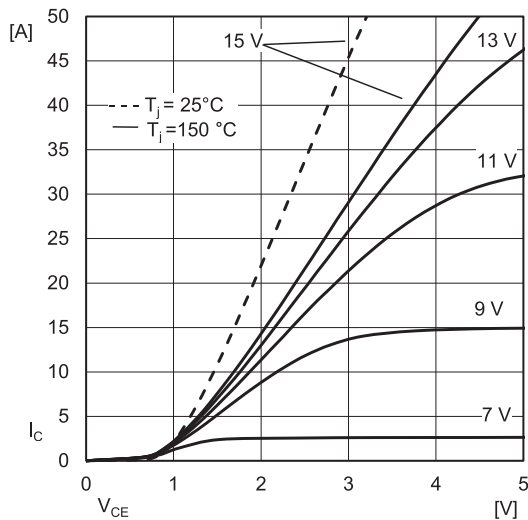


Fig. 1: Typ. IGBT output characteristic, incl.  $R_{CC+EE'}$

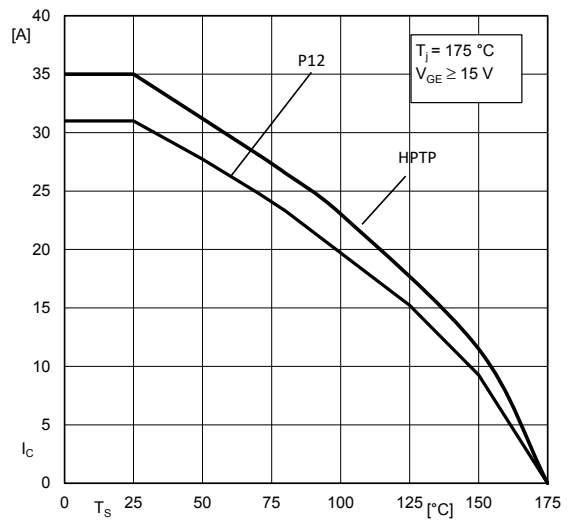


Fig. 2: IGBT rated current vs. Temperature  $I_C=f(T_s)$

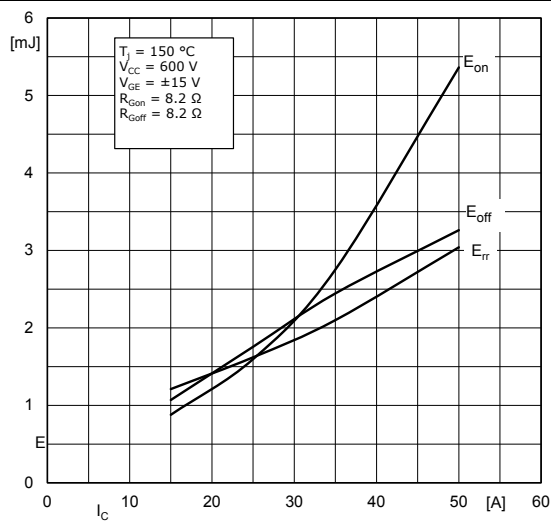


Fig. 3: Typ. turn-on /-off energy =  $f(I_C)$

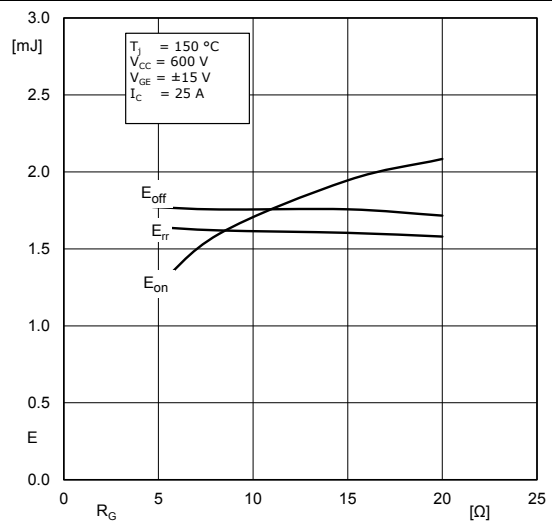


Fig. 4: Typ. turn-on /-off energy =  $f(R_G)$

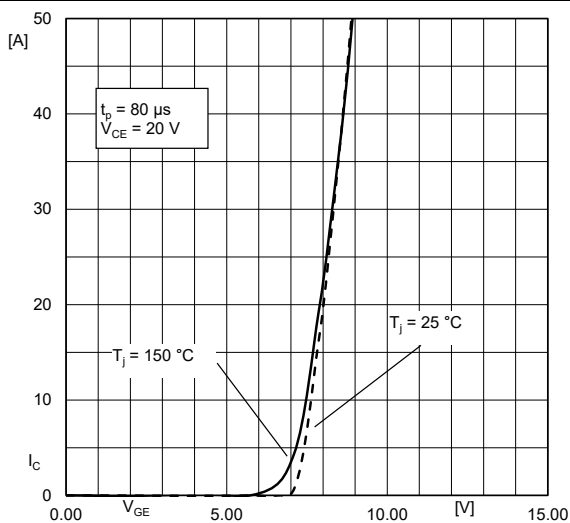


Fig. 5: Typ. IGBT transfer characteristic

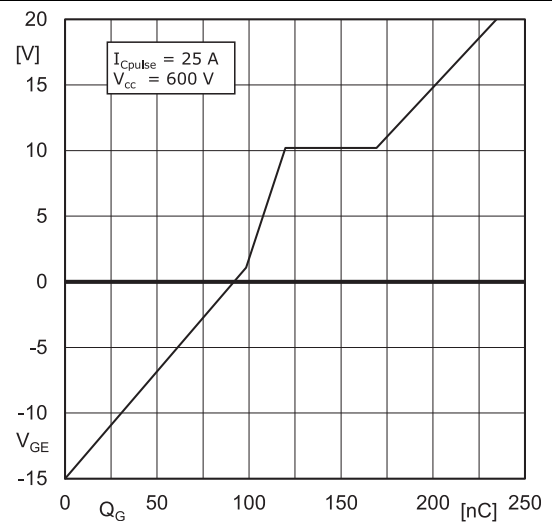
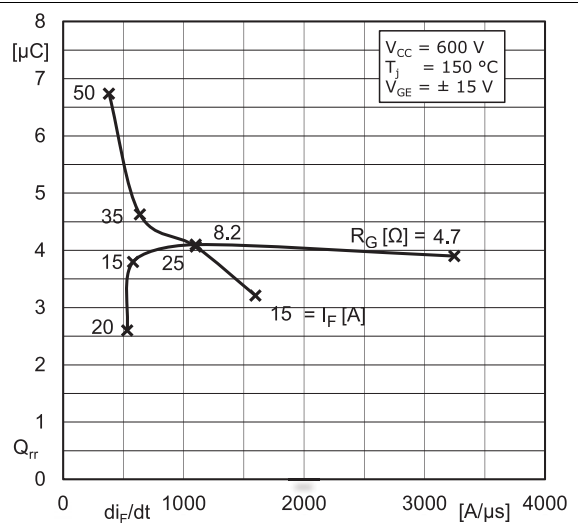
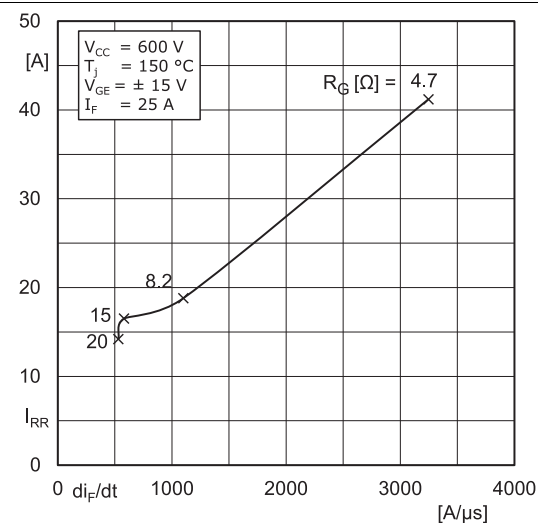
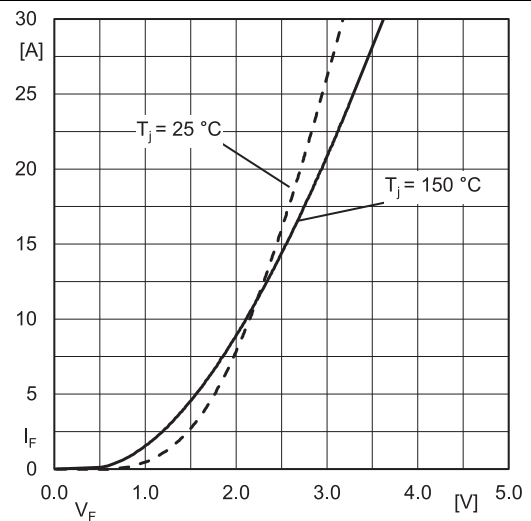
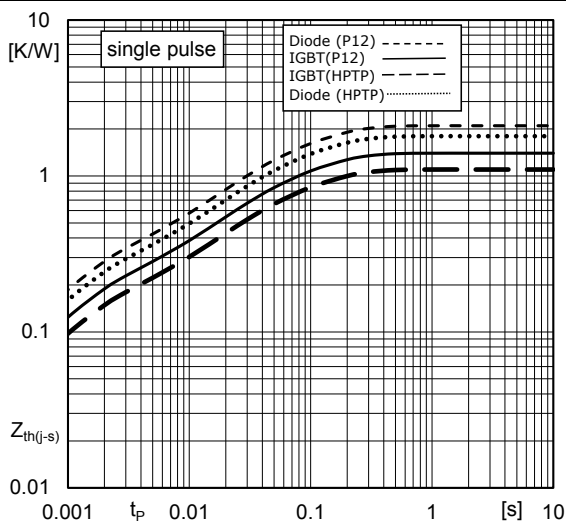
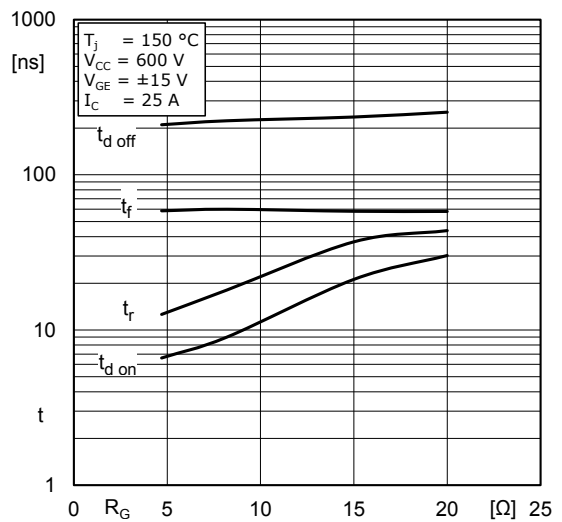
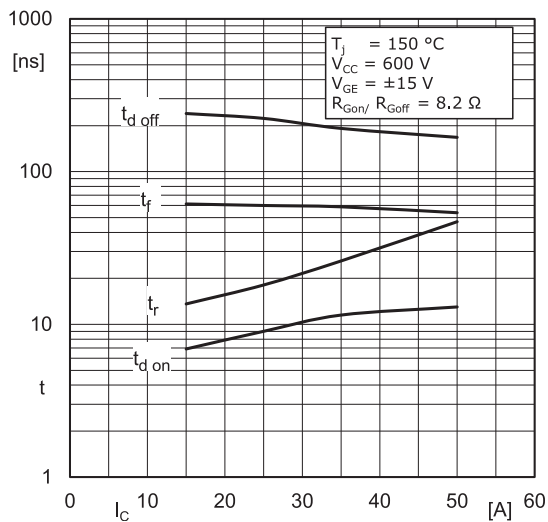


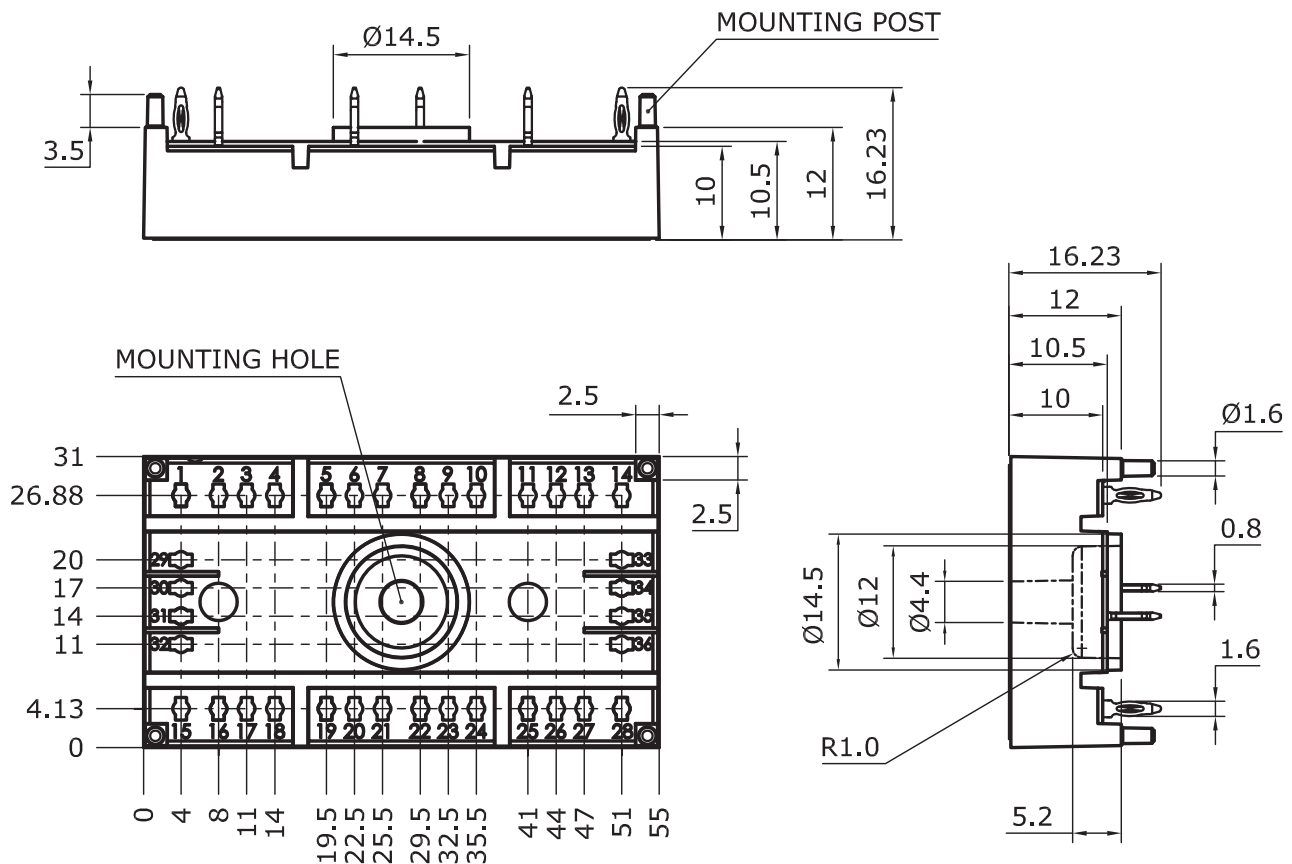
Fig. 6: Typ. IGBT gate charge characteristic



# SK25GD12F4ETp

Dimensions: mm

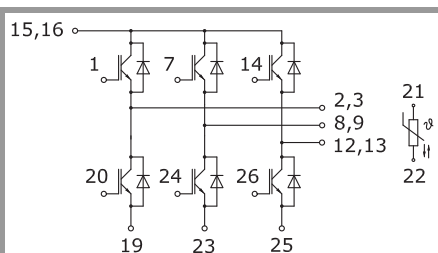
Tolerance system: ISO 2768-m



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

## IMPORTANT INFORMATION AND WARNINGS

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

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