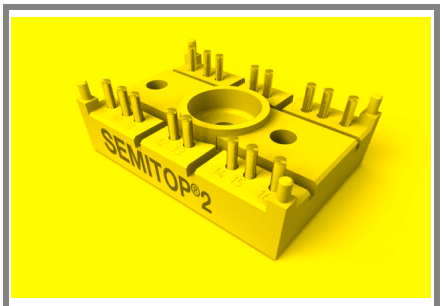
# SK 60GM123




**SEMITOP® 2**

## IGBT Module

**SK 60GM123**

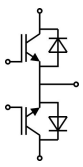
Preliminary Data

### Features

- Compact design
- One screw mounting
- Heat transfer and isolation through direct copper bonding aluminium oxide ceramic (DBC)
- High short circuit capability
- Low tail current with low temperature dependence

### Typical Applications*

- Switching (not for linear use)
- Inverter
- Switched mode power supplies
- UPS



**GM**

| **Absolute Maximum Ratings** | | | $T_s$ = 25 °C, unless otherwise specified | |
|---|---|---|---|---|
| **Symbol** | **Conditions** | | **Values** | **Units** |
| **IGBT** | | | | |
| $V_{CES}$ | $T_j$ = 25 °C | | 1200 | V |
| $I_C$ | $T_j$ = 125 °C | $T_s$ = 25 °C | 60 | A |
| | | $T_s$ = 80 °C | 40 | A |
| $I_{CRM}$ | $I_{CRM}$= 2 x $I_{Cnom}$ | | 100 | A |
| $V_{GES}$ | | | ± 20 | V |
| $t_{psc}$ | $V_{CC}$ = 600 V; $V_{GE} \leq$ 20 V; $V_{CES}$ < 1200 V | $T_j$ = 125 °C | 10 | µs |
| **Inverse Diode** | | | | |
| $I_F$ | $T_j$ = 150 °C | $T_s$ = 25 °C | 60 | A |
| | | $T_s$ = 80 °C | 40 | A |
| $I_{FRM}$ | $I_{FRM}$= 2 x $I_{Fnom}$ | | 100 | A |
| **Module** | | | | |
| $I_{t(RMS)}$ | | | | A |
| $T_{vj}$ | | | -40 ... +150 | °C |
| $T_{stg}$ | | | -40 ... +125 | °C |
| $V_{isol}$ | AC, 1 min. | | 2500 | V |

| **Characteristics** | | | $T_s$ = 25 °C, unless otherwise specified | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Conditions** | | **min.** | **typ.** | **max.** | **Units** |
| **IGBT** | | | | | | |
| $V_{GE(th)}$ | $V_{GE}$ = $V_{CE}$, $I_C$ = 2 mA | | 4,5 | 5,5 | 6,5 | V |
| $I_{CES}$ | $V_{GE}$ = V, $V_{CE}$ = $V_{CES}$ | $T_j$ = °C | | | | mA |
| $V_{CE0}$ | | $T_j$ = °C | | | | V |
| $r_{CE}$ | $V_{GE}$ = V | $T_j$ = °C | | | | mΩ |
| $V_{CE(sat)}$ | $I_{Cnom}$ = 50 A, $V_{GE}$ = 15 V | $T_j$ = 25°$C_{chiplev.}$ | | 2,5 | 3 | V |
| | | $T_j$ = 125°$C_{chiplev.}$ | | 3,1 | 3,7 | V |
| $C_{ies}$ | $V_{CE}$ = 25, $V_{GE}$ = 0 V | f = 1 MHz | | 3,3 | | nF |
| $C_{oes}$ | | | | | | nF |
| $C_{res}$ | | | | | | nF |
| $t_{d(on)}$ | $R_{Gon}$ = 23 Ω | $V_{CC}$ = 600V | | 40 | | ns |
| $t_r$ | | $I_C$= 50A | | 45 | | ns |
| $E_{on}$ | | $T_j$ = 125 °C | | 7 | | mJ |
| $t_{d(off)}$ | $R_{Goff}$ = 23 Ω | $V_{GE}$=±15V | | 300 | | ns |
| $t_f$ | | | | 45 | | ns |
| $E_{off}$ | | | | 5,2 | | mJ |
| $R_{th(j-s)}$ | per IGBT | | | | 0,6 | K/W |

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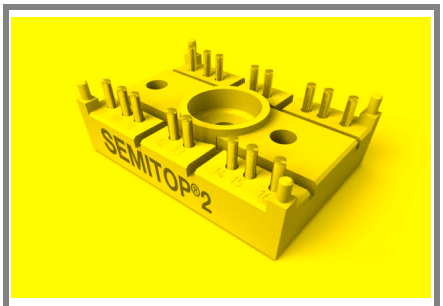


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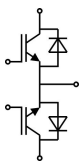


**GM**

**Characteristics**

| Symbol | Conditions | | min. | typ. | max. | Units |
|---|---|---|---|---|---|---|
| **Inverse Diode** | | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom}$ = 50 A; $V_{GE}$ = 0 V | $T_j$ = 25 °$C_{chiplev.}$ | | 2 | 2,5 | V |
| | | $T_j$ = 125 °$C_{chiplev.}$ | | 1,8 | | V |
| $V_{F0}$ | | $T_j$ = 125 °C | | 1 | 1,2 | V |
| $r_F$ | | $T_j$ = 125 °C | | 16 | 22 | mΩ |
| $I_{RRM}$ | $I_F$ = 30 A | $T_j$ = 125 °C | | 16 | | A |
| $Q_{rr}$ | di/dt = 400 A/µs | | | 5,4 | | µC |
| $E_{rr}$ | $V_{CC}$= 600V | | | 2,4 | | mJ |
| $R_{th(j-s)D}$ | per diode | | | | 0,7 | K/W |
| $M_s$ | to heat sink M1 | | | | 2 | Nm |
| w | | | | 21 | | g |

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 personal.

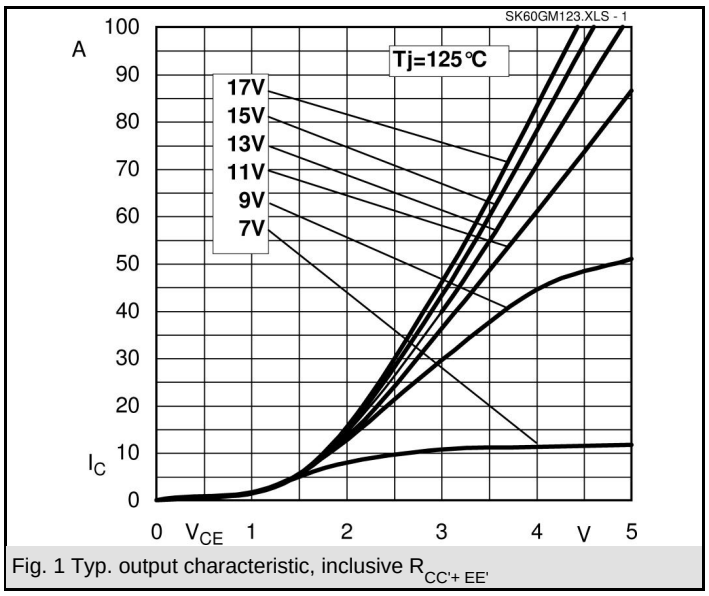



Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

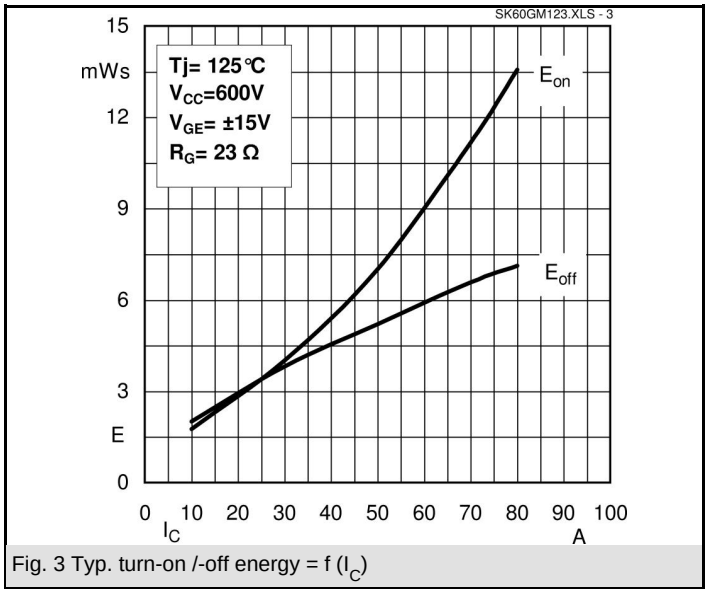



Fig. 3 Typ. turn-on /-off energy = f ($I_C$)

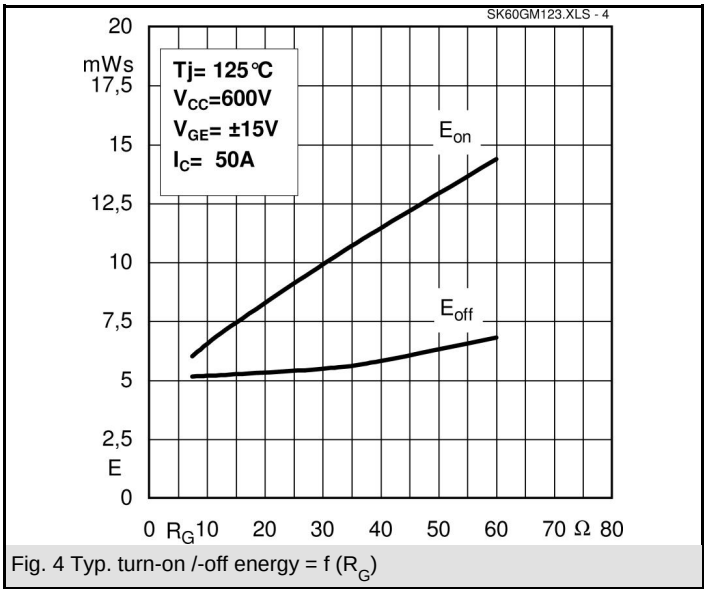



Fig. 4 Typ. turn-on /-off energy = f ($R_G$)

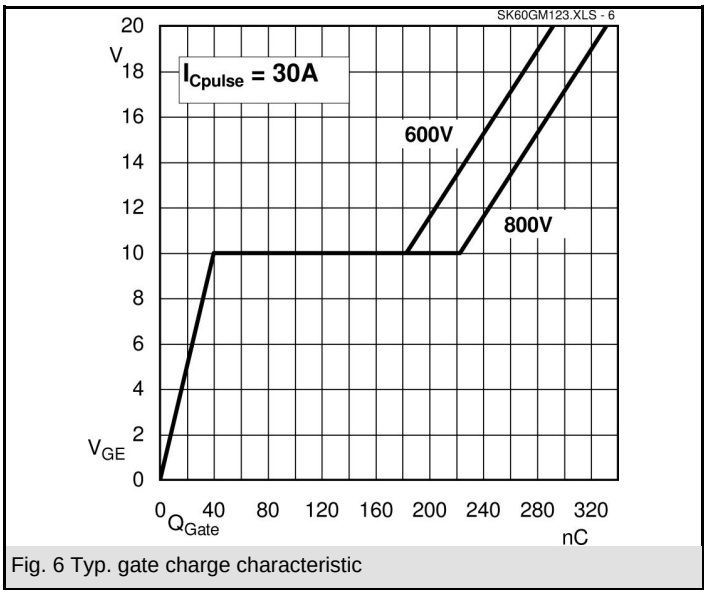



Fig. 6 Typ. gate charge characteristic

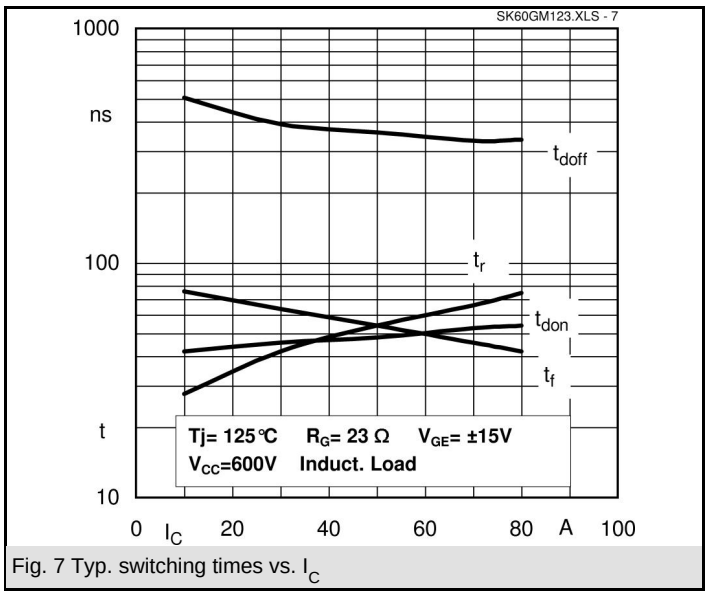



Fig. 7 Typ. switching times vs. $I_C$

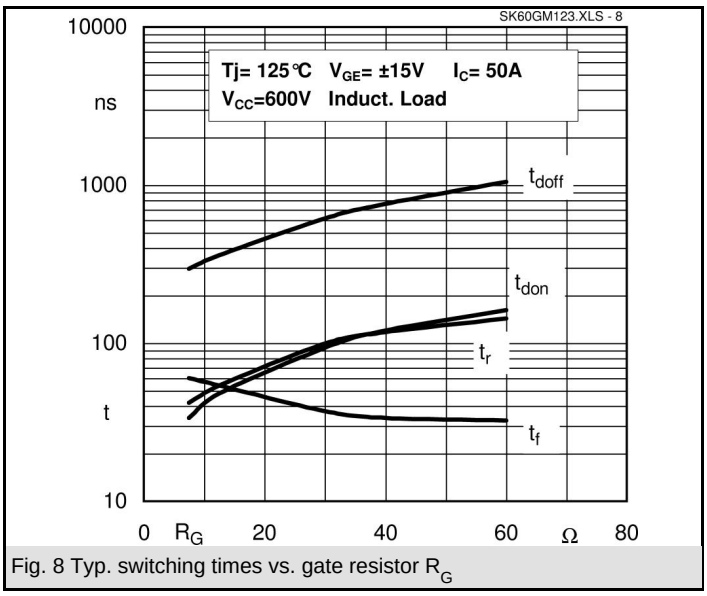



Fig. 8 Typ. switching times vs. gate resistor $R_G$

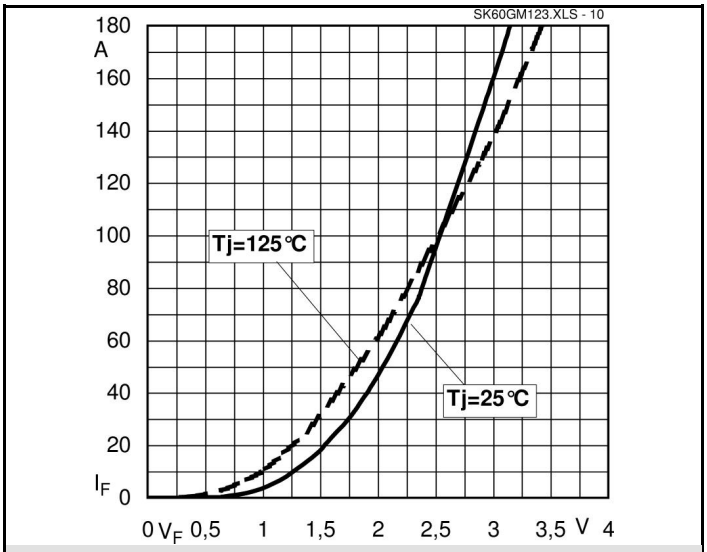
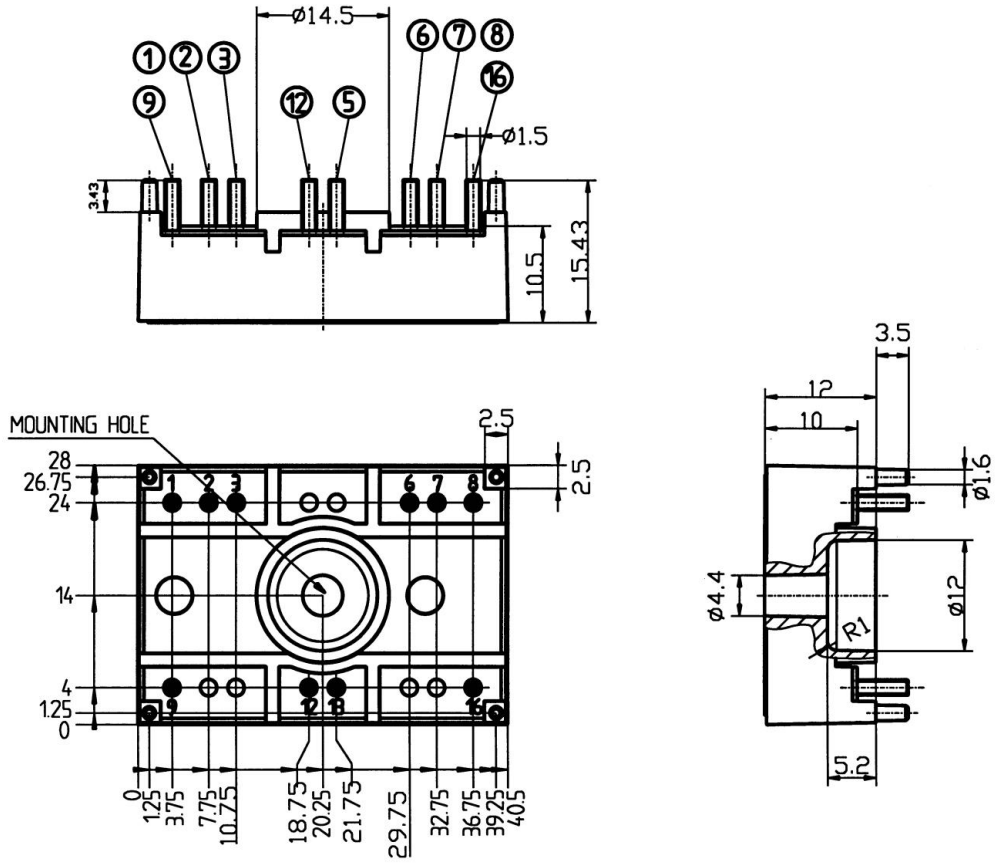


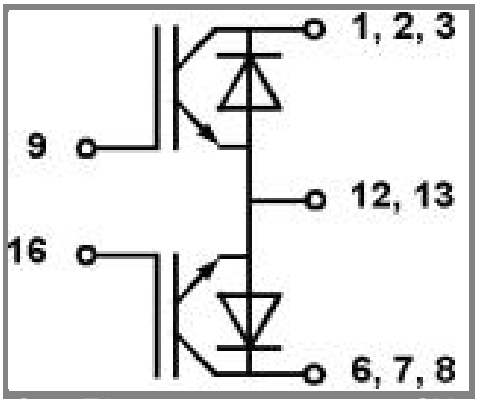

Fig. 10 CAL diode forward characteristic

UL recognized file no. E 63 532




Case T32 (Suggested hole diameter, in the PCB, for solder pins and plastic mounting pins: 2mm)




Case T35 GM