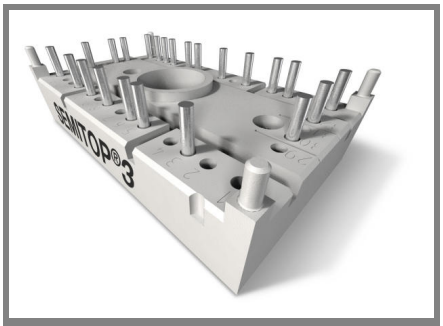
# SK50MLI065




**SEMITOP® 3**

## IGBT Module

**SK50MLI065**

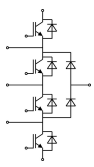
Target Data

### Features

- Compact design
- One screw mounting
- Heat transfer and isolation through direct copper bonded aluminium oxide ceramic (DCB)
- Ultra Fast NPT IGBT technology
- CAL technology FWD

### Typical Applications*

- Multi level inverter



**MLI**

| **Absolute Maximum Ratings** | | | $T_s$ = 25 °C, unless otherwise specified | |
|---|---|---|---|---|
| **Symbol** | **Conditions** | | **Values** | **Units** |
| **IGBT** | | | | |
| $V_{CES}$ | $T_j$ = 25 °C | | 600 | V |
| $I_C$ | $T_j$ = 125 °C | $T_s$ = 25 °C | 54 | A |
| | | $T_s$ = 80 °C | 40 | A |
| $I_{CRM}$ | $I_{CRM}$= 2 x $I_{Cnom}$ | | 120 | A |
| $V_{GES}$ | | | ± 20 | V |
| $t_{psc}$ | $V_{CC}$ = 300 V; $V_{GE} \leq$ 20 V; $V_{CES}$ < 600 V | $T_j$ = 125 °C | 10 | µs |
| **Inverse Diode** | | | | |
| $I_F$ | $T_j$ = 150 °C | $T_s$ = 25 °C | 36 | A |
| | | $T_s$ = 80 °C | 24 | A |
| $I_{FRM}$ | $I_{FRM}$= 2 x $I_{Fnom}$ | | | A |
| $I_{FSM}$ | $t_p$ = 10 ms; half sine wave | $T_j$ = 150 °C | 200 | A |
| **Freewheeling Diode** | | | | |
| $I_F$ | $T_j$ = 150 °C | $T_{case}$ = 25 °C | 64 | A |
| | | $T_{case}$ = 80 °C | 42 | A |
| $I_{FRM}$ | | | | A |
| $I_{FSM}$ | $t_p$ = 10 ms; half sine wave | $T_j$ = 150 °C | 440 | 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** | | | | | | |
| $V_{GE(th)}$ | $V_{GE}$ = $V_{CE}$, $I_C$ = 1,4 mA | | 3 | 4 | 5 | V |
| $I_{CES}$ | $V_{GE}$ = 0 V, $V_{CE}$ = $V_{CES}$ | $T_j$ = 25 °C | | | 0,0044 | mA |
| $I_{GES}$ | $V_{CE}$ = 0 V, $V_{GE}$ = 20 V | $T_j$ = 25 °C | | | 240 | nA |
| $V_{CE0}$ | | $T_j$ = 25 °C | | 1,4 | 1,9 | V |
| | | $T_j$ = 125 °C | | 1,7 | 2,2 | V |
| $r_{CE}$ | $V_{GE}$ = 15 V | $T_j$ = 25°C | | | | mΩ |
| | | $T_j$ = 125°C | | 22 | | mΩ |
| $V_{CE(sat)}$ | $I_{Cnom}$ = 60 A, $V_{GE}$ = 15 V | $T_j$ = 25°C$_{chiplev.}$ | | 1,8 | | V |
| | | $T_j$ = 125°C$_{chiplev.}$ | | 2,1 | | V |
| $C_{ies}$ | $V_{CE}$ = 25, $V_{GE}$ = 0 V | f = 1 MHz | | 3,2 | | nF |
| $C_{oes}$ | | | | 0,3 | | nF |
| $C_{res}$ | | | | 0,18 | | nF |
| $t_{d(on)}$ | $R_{Gon}$ = 15 Ω | $V_{CC}$ = 300V | | 60 | | ns |
| $t_r$ | | $I_C$= 40A | | 30 | | ns |
| $E_{on}$ | | $T_j$ = 125 °C | | 1,07 | | mJ |
| $t_{d(off)}$ | $R_{Goff}$ = 15 Ω | $V_{GE}$=±15V | | 223 | | ns |
| $t_f$ | | | | 20 | | ns |
| $E_{off}$ | | | | 0,76 | | mJ |
| $R_{th(j-s)}$ | per IGBT | | | | 0,85 | K/W |

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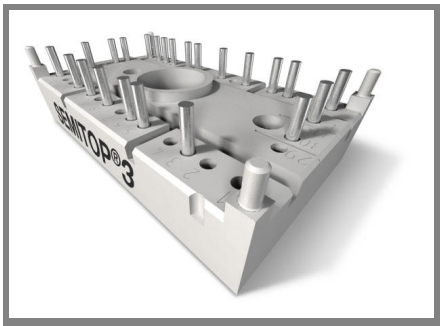

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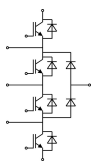

**MLI**

| Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Conditions** | | **min.** | **typ.** | **max.** | **Units** |
| **Antiparallel Diode (D1)** | | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom}$ = 25 A; $V_{GE}$ = 0 V | $T_j$ = 25 °$C_{chiplev.}$ | | 1,45 | | V |
| | | $T_j$ = 125 °$C_{chiplev.}$ | | 1,4 | | V |
| $V_{F0}$ | | $T_j$ = 25 °C | | | | V |
| | | $T_j$ = 125 °C | | 0,85 | | V |
| $r_F$ | | $T_j$ = 25 °C | | | | mΩ |
| | | $T_j$ = 125 °C | | 22 | | mΩ |
| $I_{RRM}$ | $I_F$ = 50 A | $T_j$ = 125 °C | | | | A |
| $Q_{rr}$ | di/dt = -2400 A/µs | | | | | µC |
| $E_{rr}$ | $V_R$= 300V | | | | | mJ |
| $R_{th(j-s)D}$ | per diode | | | | 1,7 | K/W |
| **Freewheeling Diode (D2)** | | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom}$ = 50 A; $V_{GE}$ = 0 V | $T_j$ = 25 °$C_{chiplev.}$ | | 1,45 | | V |
| | | $T_j$ = 125 °$C_{chiplev.}$ | | 1,4 | | V |
| $V_{F0}$ | | $T_j$ = 125 °C | | 0,85 | | V |
| $r_F$ | | $T_j$ = 125 °C | | 11 | | V |
| $I_{RRM}$ | $I_F$ = 50 A | $T_j$ = 125 °C | | | | A |
| $Q_{rr}$ | di/dt = -2400 A/µs | | | | | µC |
| $E_{rr}$ | $V_R$=300V | | | | | mJ |
| $R_{th(j-s)FD}$ | per diode | | | | 1,1 | K/W |
| $M_s$ | to heat sink | | 2,25 | | 2,5 | Nm |
| w | | | | 30 | | 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.

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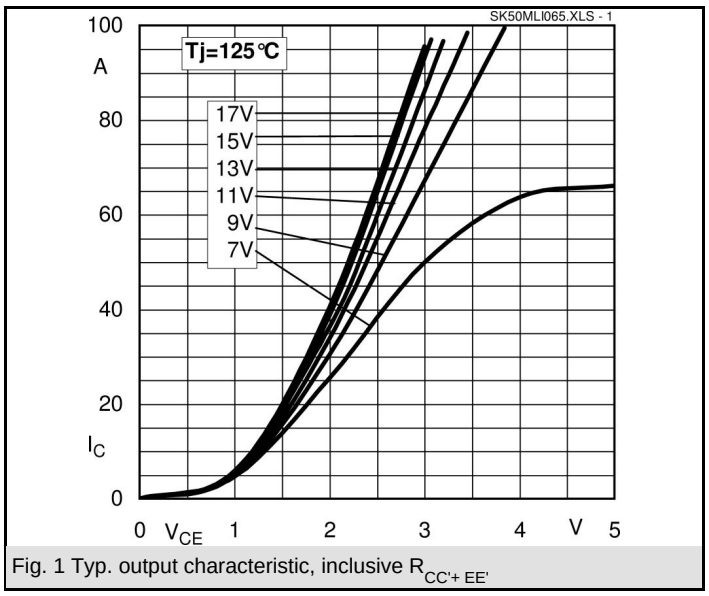


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+ EE'}$

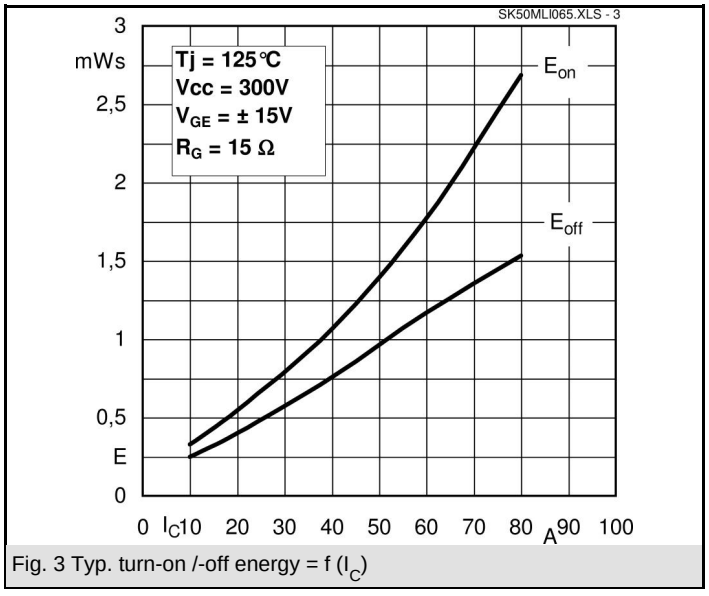


Fig. 3 Typ. turn-on /-off energy = f ($I_C$)

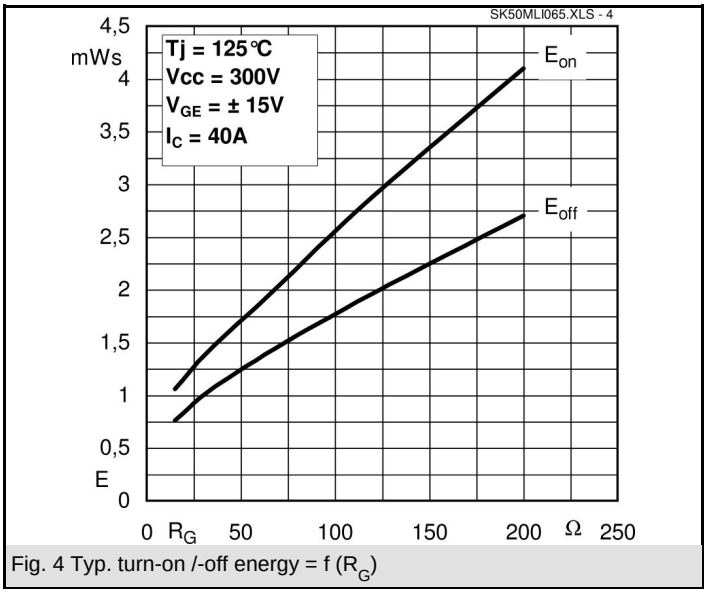


Fig. 4 Typ. turn-on /-off energy = f ($R_G$)

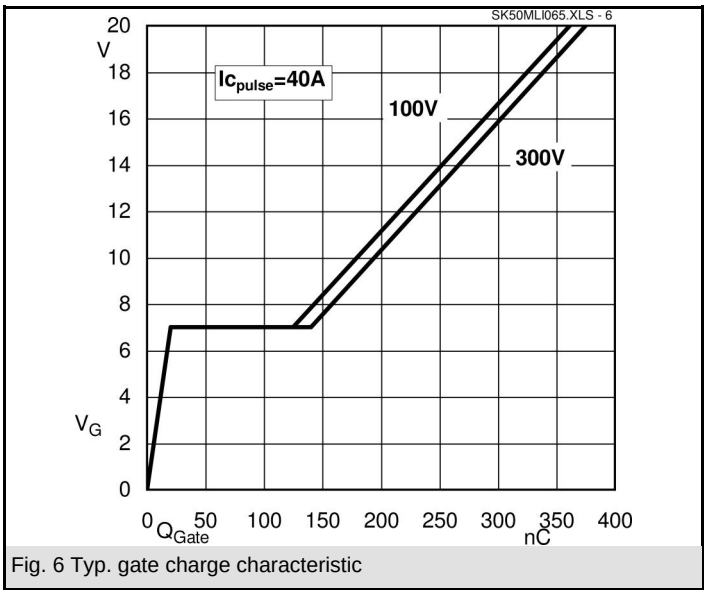


Fig. 6 Typ. gate charge characteristic

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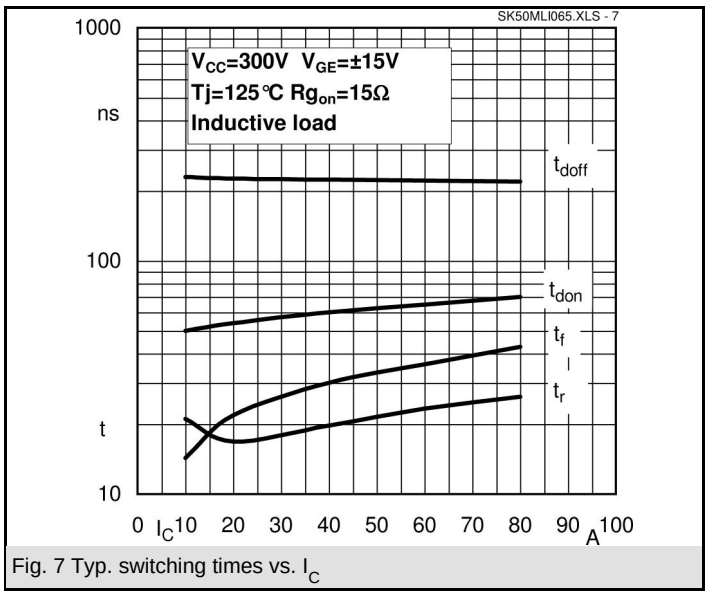


Fig. 7 Typ. switching times vs. $I_C$

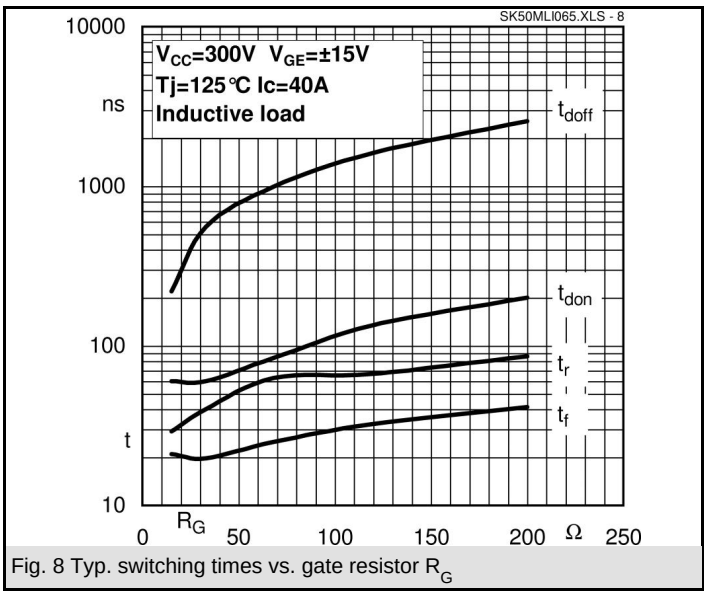


Fig. 8 Typ. switching times vs. gate resistor $R_G$

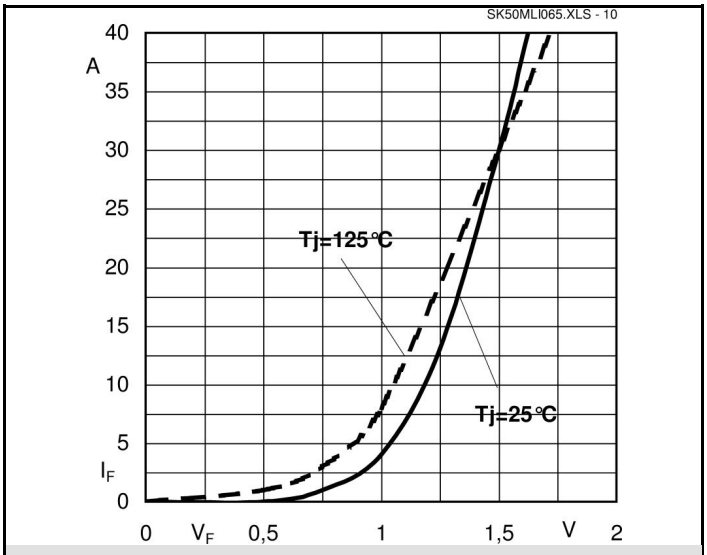


Fig. 10 CAL diode forward characteristic

Antiparallel Diode (D1)

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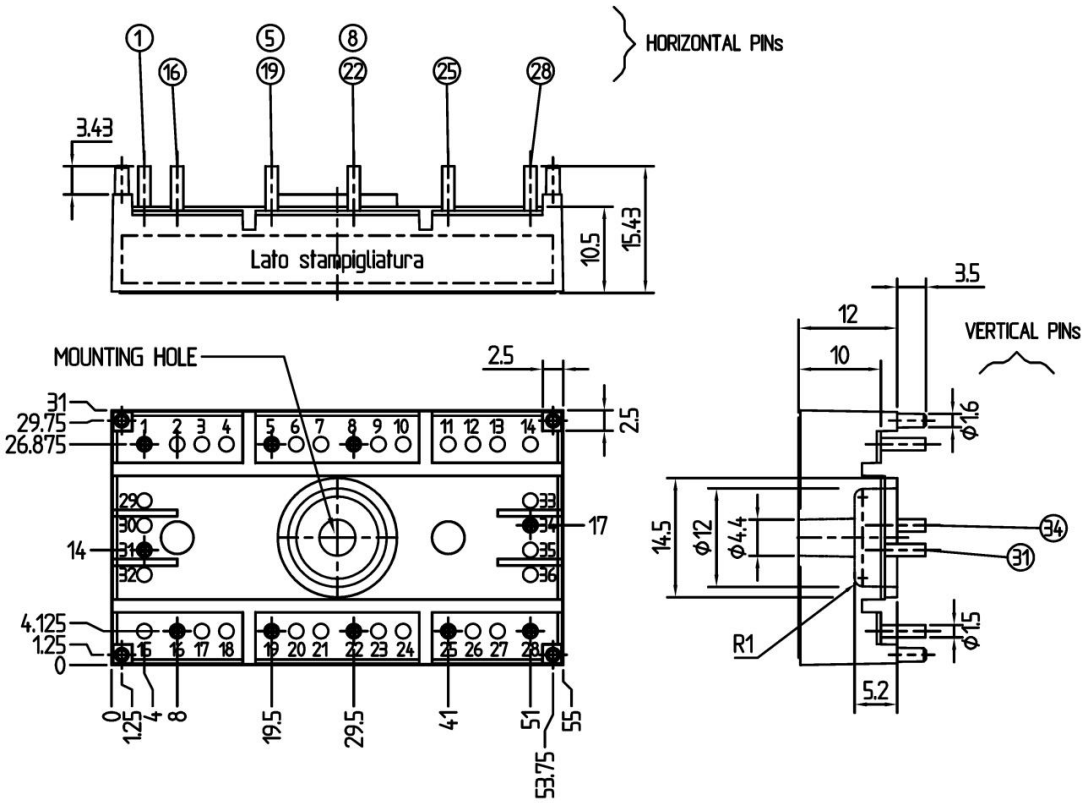
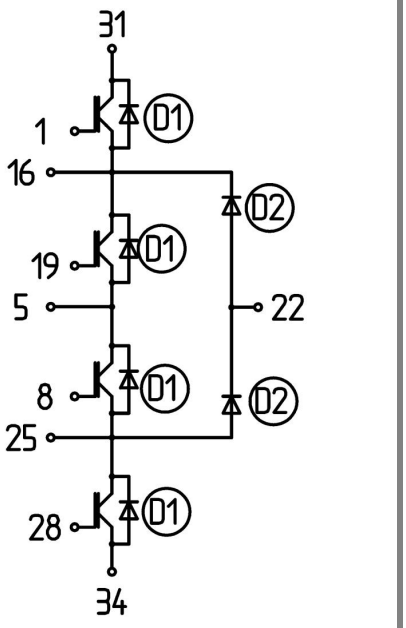
UL recognized file no. E 63 532




Case T 76 (Suggested hole diameter, in the PCB, for solder pins and plastic mounting pins: 2mm)




Case T 76 MLI

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