

**SEMITOP® 4**

## IGBT Module

**SK75MLI066T**

Preliminary Data

### Features

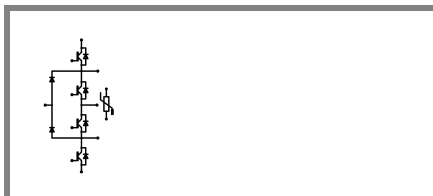
- Compact design
- One screw mounting
- Heat transfer and isolation through direct copper bonded aluminium oxide ceramic (DCB)
- Trench IGBT technology
- CAL technology FWD
- Integrated NTC temperature sensor

### Typical Applications\*

- Multi level inverter

### Remarks

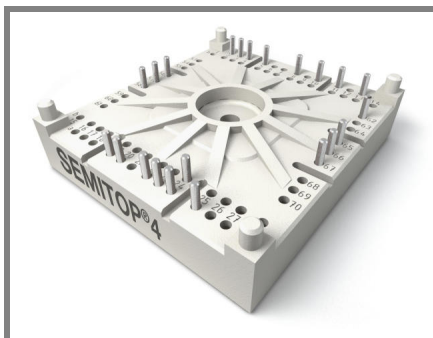
- $V_{isol} = 3000V$  AC, 1s, 50Hz
- Dynamic measure: DUT= IGBT (Gate pin 55) and Neutral Clamp Diode (Kathode pin 56) as free-wheeling diode



**MLI-T**

| Absolute Maximum Ratings  |   | $T_s = 25\text{ °C}$ , unless otherwise specified |    |       |
|---------------------------|---|---|----|-------|
| Symbol                    | Conditions  | Values  |    | Units |
| <b>IGBT</b>               |   |   |    |       |
| $V_{CES}$                 | $T_j = 25\text{ °C}$  | 600   |    | V     |
| $I_C$                     | $T_j = 175\text{ °C}$   | $T_s = 25\text{ °C}$                              | 83 | A     |
|                           |   | $T_s = 70\text{ °C}$                              | 67 | A     |
| $I_{CRM}$                 | $I_{CRM} = 2 \times I_{Cnom}$   | 150   |    | A     |
| $V_{GES}$                 |   | ± 20  |    | V     |
| $t_{psc}$                 | $V_{CC} = 360\text{ V}; V_{GE} \leq 20\text{ V}; T_j = 125\text{ °C}$<br>$V_{CES} < 600\text{ V}$ | 6   |    | µs    |
| <b>Inverse Diode</b>      |   |   |    |       |
| $I_F$                     | $T_j = 175\text{ °C}$   | $T_s = 25\text{ °C}$                              | 92 | A     |
|                           |   | $T_s = 70\text{ °C}$                              | 73 | A     |
| $I_{FRM}$                 | $I_{FRM} = 2 \times I_{Fnom}$   | 150   |    | A     |
| <b>Freewheeling Diode</b> |   |   |    |       |
| $I_F$                     | $T_j = 175\text{ °C}$   | $T_s = 25\text{ °C}$                              | 92 | A     |
|                           |   | $T_s = 70\text{ °C}$                              | 73 | A     |
| $I_{FRM}$                 | $I_{FRM} = 2 \times I_{Fnom}$   | 150   |    | A     |
| <b>Module</b>             |   |   |    |       |
| $I_{t(RMS)}$              |   |   |    | A     |
| $T_{vj}$                  |   | -40 ... +175                                      |    | °C    |
| $T_{stg}$                 |   | -40 ... +125                                      |    | °C    |
| $V_{isol}$                | AC, 1 min.  | 2500  |    | V     |

| Characteristics |   | $T_s = 25\text{ °C}$ , unless otherwise specified |        |      |       |
|-----------------|---|---|--------|------|-------|
| Symbol          | Conditions  | min.  | typ.   | max. | Units |
| <b>IGBT</b>     |   |   |        |      |       |
| $V_{GE(th)}$    | $V_{GE} = V_{CE}, I_C = 1,2\text{ mA}$                | 5   | 5,8    | 6,5  | V     |
| $I_{CES}$       | $V_{GE} = 0\text{ V}, V_{CE} = V_{CES}$               | $T_j = 25\text{ °C}$                              | 0,0038 |      | mA    |
|                 |   | $T_j = 125\text{ °C}$                             |        |      | mA    |
| $I_{GES}$       | $V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}$           |   |        | 600  | nA    |
| $V_{CE0}$       |   | $T_j = 25\text{ °C}$                              | 0,8    | 1,1  | V     |
|                 |   | $T_j = 150\text{ °C}$                             | 0,7    | 1    | V     |
| $r_{CE}$        | $V_{GE} = 15\text{ V}$                                | $T_j = 25\text{ °C}$                              | 8      | 10   | mΩ    |
|                 |   | $T_j = 150\text{ °C}$                             | 13     | 14   | mΩ    |
| $V_{CE(sat)}$   | $I_{Cnom} = 75\text{ A}, V_{GE} = 15\text{ V}$        | $T_j = 25\text{ °C}_{chiplev.}$                   | 1,45   | 1,85 | V     |
|                 |   | $T_j = 150\text{ °C}_{chiplev.}$                  | 1,65   | 2,05 | V     |
| $C_{ies}$       | $V_{CE} = 25, V_{GE} = 0\text{ V}$                    | $f = 1\text{ MHz}$                                | 4,7    |      | nF    |
| $C_{oes}$       |   |   | 0,3    |      | nF    |
| $C_{res}$       |   |   | 0,145  |      | nF    |
| $Q_G$           | $V_{GE} = -7V...+15V$                                 | 650   |        | nC   |       |
| $R_{Gint}$      | $T_j = 150\text{ °C}$                                 | 4   |        | Ω    |       |
| $t_{d(on)}$     | $R_{Gon} = 4\text{ Ω}$<br>$di/dt = 4100\text{ A/μs}$  | $V_{CC} = 300V$<br>$I_C = 75A$                    | 97     |      | ns    |
| $t_r$           |   |   | 34     |      | ns    |
| $E_{on}$        | $R_{Goff} = 4\text{ Ω}$<br>$di/dt = 4100\text{ A/μs}$ | $T_j = 150\text{ °C}$<br>$V_{GE} = -7/+15V$       | 1,7    |      | mJ    |
| $t_{d(off)}$    |   |   | 339    |      | ns    |
| $t_f$           |   |   | 65     |      | ns    |
| $E_{off}$       |   |   | 2,8    |      | mJ    |
| $R_{th(j-s)}$   | per IGBT  | 0,75  |        | K/W  |       |



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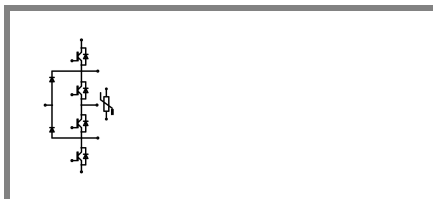
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| Characteristics                                 |   |                                 |        |      |       |
|---|---|---------------------------------|--------|------|-------|
| Symbol  | Conditions                              | min.                            | typ.   | max. | Units |
| <b>Inverse Diode</b>                            |   |                                 |        |      |       |
| $V_F = V_{EC}$                                  | $I_{Fnom} = 75 A; V_{GE} = 0 V$         | $T_j = 25 ^\circ C_{chiplev.}$  | 1,5    | 1,7  | V     |
|   |   | $T_j = 150 ^\circ C_{chiplev.}$ | 1,5    | 1,7  | V     |
| $V_{F0}$  |   | $T_j = 25 ^\circ C$             | 1      | 1,1  | V     |
|   |   | $T_j = 150 ^\circ C$            | 0,9    | 1    | V     |
| $r_F$   |   | $T_j = 25 ^\circ C$             | 6,7    | 8    | mΩ    |
|   |   | $T_j = 150 ^\circ C$            | 8      | 9,3  | mΩ    |
| $I_{RRM}$                                       | $I_F = 75 A$                            | $T_j = 150 ^\circ C$            | 65     |      | A     |
| $Q_{rr}$  | $di/dt = 4100 A/\mu s$                  |                                 | 4      |      | μC    |
| $E_{rr}$  | $V_R = 300V$                            |                                 | 1,1    |      | mJ    |
| $R_{th(j-s)D}$                                  | per diode                               |                                 | 1,2    |      | K/W   |
| <b>Freewheeling Diode (Neutral Clamp Diode)</b> |   |                                 |        |      |       |
| $V_F = V_{EC}$                                  | $I_{Fnom} = 75 A; V_{GE} = 0 V$         | $T_j = 25 ^\circ C_{chiplev.}$  | 1,5    | 1,7  | V     |
|   |   | $T_j = 150 ^\circ C_{chiplev.}$ | 1,5    | 1,7  | V     |
| $V_{F0}$  |   | $T_j = 25 ^\circ C$             | 1      | 1,1  | V     |
|   |   | $T_j = 150 ^\circ C$            | 0,9    | 1    | V     |
| $r_F$   |   | $T_j = 25 ^\circ C$             | 6,7    | 8    | V     |
|   |   | $T_j = 150 ^\circ C$            | 8      | 9,3  | V     |
| $I_{RRM}$                                       | $I_F = 75 A$                            | $T_j = 150 ^\circ C$            | 65     |      | A     |
| $Q_{rr}$  | $di/dt = 3100 A/\mu s$                  |                                 | 4      |      | μC    |
| $E_{rr}$  | $V_R = 300V$                            |                                 | 1,1    |      | mJ    |
| $R_{th(j-s)FD}$                                 | per diode                               |                                 | 1,2    |      | K/W   |
| $M_s$   | to heat sink                            | 2,5                             |        | 2,75 | Nm    |
| w   |   |                                 | 60     |      | g     |
| <b>Temperature sensor</b>                       |   |                                 |        |      |       |
| $R_{100}$                                       | $T_s = 100^\circ C (R_{25} = 5k\Omega)$ |                                 | 493±5% |      | Ω     |

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.

