



SEMITRANS® 2

IGBT Modules

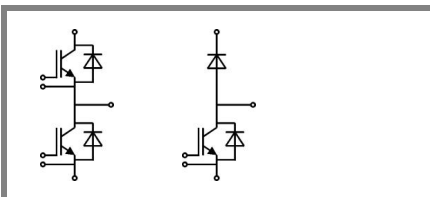
SKM 50GB123D
SKM 50GAL123D

Features

- MOS input (voltage controlled)
- Low inductance case
- Low tail current with low temperature dependence
- High short circuit capability, self limiting to $6 \times I_{C\text{NOM}}$
- Fast and soft CAL diodes
- Isolated copper base plate using DCB (Direct Copper Bonding Technology)

Typical Applications*

- AC inverter drives
- Power supplies



GB

GAL

| Absolute Maximum Ratings | | $T_c = 25\text{ }^\circ\text{C}$, unless otherwise specified | | |
|---------------------------|---|---|-----|------------------|
| Symbol | Conditions | Values | | Units |
| IGBT | | | | |
| V_{CES} | $T_j = 25\text{ }^\circ\text{C}$ | 1200 | | V |
| I_C | $T_j = 150\text{ }^\circ\text{C}$ | $T_{\text{case}} = 25\text{ }^\circ\text{C}$ | 50 | A |
| | | $T_{\text{case}} = 80\text{ }^\circ\text{C}$ | 40 | A |
| I_{CRM} | $I_{\text{CRM}} = 2 \times I_{\text{Cnom}}$ | 100 | | A |
| V_{GES} | | ± 20 | | V |
| t_{psc} | $V_{\text{CC}} = 600\text{ V}; V_{\text{GE}} \leq 20\text{ V}; T_j = 125\text{ }^\circ\text{C}$ $V_{\text{CES}} < 1200\text{ V}$ | 10 | | μs |
| Inverse Diode | | | | |
| I_F | $T_j = 150\text{ }^\circ\text{C}$ | $T_{\text{case}} = 25\text{ }^\circ\text{C}$ | 50 | A |
| | | $T_{\text{case}} = 80\text{ }^\circ\text{C}$ | 40 | A |
| I_{FRM} | $I_{\text{FRM}} = 2 \times I_{\text{Fnom}}$ | 100 | | A |
| I_{FSM} | $t_p = 10\text{ ms}; \sin.$ | $T_j = 150\text{ }^\circ\text{C}$ | 550 | A |
| Freewheeling Diode | | | | |
| I_F | $T_j = 150\text{ }^\circ\text{C}$ | $T_{\text{case}} = 25\text{ }^\circ\text{C}$ | 50 | A |
| | | $T_{\text{case}} = 80\text{ }^\circ\text{C}$ | 40 | A |
| I_{FRM} | $I_{\text{FRM}} = 2 \times I_{\text{Fnom}}$ | 100 | | A |
| I_{FSM} | $t_p = 10\text{ ms}; \sin.$ | $T_j = 150\text{ }^\circ\text{C}$ | 550 | A |
| Module | | | | |
| $I_{\text{t(RMS)}}$ | | 200 | | A |
| T_{vj} | | - 40 ... +150 | | $^\circ\text{C}$ |
| T_{stg} | | 125 | | $^\circ\text{C}$ |
| V_{isol} | AC, 1 min. | 2500 | | V |

| Characteristics | | $T_c = 25\text{ }^\circ\text{C}$, unless otherwise specified | | | | |
|----------------------|--|---|--------------------------------------|------|----------|------------------|
| Symbol | Conditions | min. | typ. | max. | Units | |
| IGBT | | | | | | |
| $V_{\text{GE(th)}}$ | $V_{\text{GE}} = V_{\text{CE}}, I_C = 2\text{ mA}$ | 4,5 | 5,5 | 6,5 | V | |
| I_{CES} | $V_{\text{GE}} = 0\text{ V}, V_{\text{CE}} = V_{\text{CES}}$ | $T_j = 25\text{ }^\circ\text{C}$ | 0,1 | | 0,3 | mA |
| | | $T_j = 125\text{ }^\circ\text{C}$ | | | | mA |
| V_{CE0} | | $T_j = 25\text{ }^\circ\text{C}$ | 1 | | 1,15 | V |
| | | $T_j = 125\text{ }^\circ\text{C}$ | 0,9 | | 1,05 | V |
| r_{CE} | $V_{\text{GE}} = 15\text{ V}$ | $T_j = 25\text{ }^\circ\text{C}$ | 30 | | 37 | $\text{m}\Omega$ |
| | | $T_j = 125\text{ }^\circ\text{C}$ | 44 | | 53 | $\text{m}\Omega$ |
| $V_{\text{CE(sat)}}$ | $I_{\text{Cnom}} = 50\text{ A}, V_{\text{GE}} = 15\text{ V}$ | $T_j = 25\text{ }^\circ\text{C}_{\text{chiplev.}}$ | 2,5 | | 3 | V |
| | | $T_j = 125\text{ }^\circ\text{C}_{\text{chiplev.}}$ | 3,1 | | 3,7 | V |
| C_{ies} | $V_{\text{CE}} = 25, V_{\text{GE}} = 0\text{ V}$ | | | 3,3 | nF | |
| C_{oes} | | | | 0,5 | nF | |
| C_{res} | | | | 0,2 | nF | |
| Q_G | $V_{\text{GE}} = -8\text{ V} - +20\text{ V}$ | | | 500 | nC | |
| R_{Gint} | $T_j = \text{ }^\circ\text{C}$ | | | 2,5 | Ω | |
| $t_{\text{d(on)}}$ | $R_{\text{Gon}} = 27\text{ }\Omega$ | $V_{\text{CC}} = 600\text{ V}$ $I_C = 40\text{ A}$ | | | 70 | ns |
| | | | $R_{\text{Goff}} = 27\text{ }\Omega$ | | | 60 |
| E_{on} | | | | 7 | mJ | |
| $t_{\text{d(off)}}$ | | $T_j = 125\text{ }^\circ\text{C}$ | | | 400 | ns |
| | | | | | 45 | ns |
| E_{off} | | | | 4,5 | mJ | |
| $R_{\text{th(j-c)}}$ | per IGBT | | | 0,4 | K/W | |



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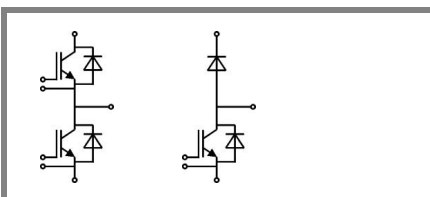
Typical Applications*

- AC inverter drives
- Power supplies

| Characteristics | | | min. | typ. | max. | Units |
|-----------------------------------|---|---|------|--------------|----------|---------------|
| Inverse Diode | | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom} = 50 \text{ A}; V_{GE} = 0 \text{ V}$ | $T_j = 25 \text{ }^\circ\text{C}_{chiplev.}$ $T_j = 125 \text{ }^\circ\text{C}_{chiplev.}$ | | 2 1,8 | 2,5 | V V |
| V_{F0} | | $T_j = 25 \text{ }^\circ\text{C}$ $T_j = 125 \text{ }^\circ\text{C}$ | | 1,1 | 1,2 | V V |
| r_F | | $T_j = 25 \text{ }^\circ\text{C}$ $T_j = 125 \text{ }^\circ\text{C}$ | | 18 | 26 22 | mΩ mΩ |
| I_{RRM} Q_{rr} E_{rr} | $I_F = 40 \text{ A}$ $di/dt = 800 \text{ A}/\mu\text{s}$ $V_{cc} = 600\text{V}$ | $T_j = 125 \text{ }^\circ\text{C}$ | | 35 7 2 | | A μC mJ |
| $R_{th(j-c)}$ | per diode | | | | 0,7 | K/W |
| Freewheeling Diode | | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom} = 50 \text{ A}; V_{GE} = 0 \text{ V}$ | $T_j = 25 \text{ }^\circ\text{C}_{chiplev.}$ $T_j = 125 \text{ }^\circ\text{C}_{chiplev.}$ | | 2 1,8 | 2,5 | V V |
| V_{F0} | | $T_j = 25 \text{ }^\circ\text{C}$ $T_j = 125 \text{ }^\circ\text{C}$ | | 1,1 | 1,2 | V V |
| r_F | | $T_j = 25 \text{ }^\circ\text{C}$ $T_j = 125 \text{ }^\circ\text{C}$ | | 18 | 26 | V V |
| I_{RRM} Q_{rr} E_{rr} | $I_F = 40 \text{ A}$ $di/dt = 800 \text{ A}/\mu\text{s}$ $V_{cc} = 600\text{V}$ | $T_j = 125 \text{ }^\circ\text{C}$ | | 35 7 2 | | A μC mJ |
| $R_{th(j-c)}$ | per diode | | | | 0,7 | K/W |
| Module | | | | | | |
| L_{CE} | | | | | 30 | nH |
| $R_{CC'+EE'}$ | res., terminal-chip | $T_{case} = 25 \text{ }^\circ\text{C}$ $T_{case} = 125 \text{ }^\circ\text{C}$ | | 0,75 1 | | mΩ mΩ |
| $R_{th(c-s)}$ | per module | | | | 0,05 | K/W |
| M_s | to heat sink M6 | | 3 | | 5 | Nm |
| M_t | to terminals M5 | | 2,5 | | 5 | Nm |
| w | | | | | 160 | 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.



GB

GAL

