



SEMITRANS™ 2

## Superfast NPT-IGBT Modules

SKM 75GB063D

SKM 75GAR063D

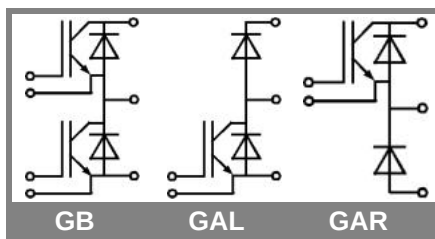
SKM 75GAL063D

### Features

- N channel, homogeneous Si-structure (NPT-Non punch-through IGBT)
- Low tail current with low temperature dependence
- High short circuit capability, self limiting if term. G is clamped to E
- Pos. temp.-coeff. of  $V_{CEsat}$
- Very low  $C_{ies}$ ,  $C_{oes}$ ,  $C_{res}$
- Latch-up free
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DBC Direct Copper Bonding Technology without hard mould
- Large clearance (10 mm) and creepage distances (20 mm)

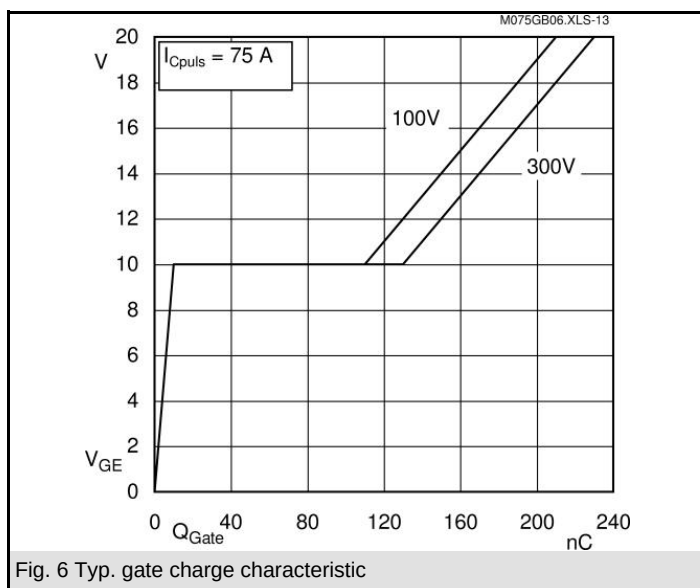
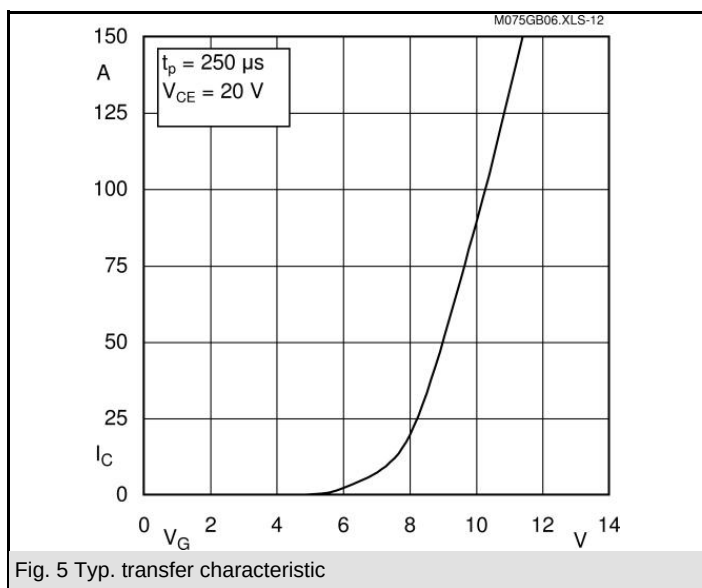
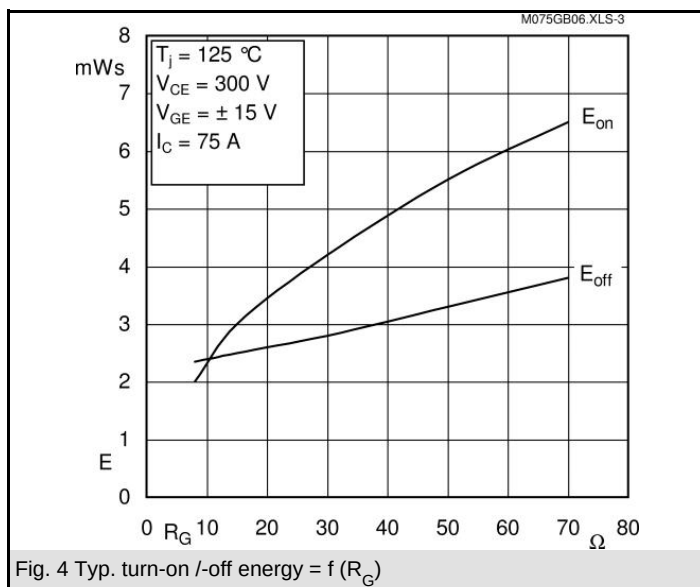
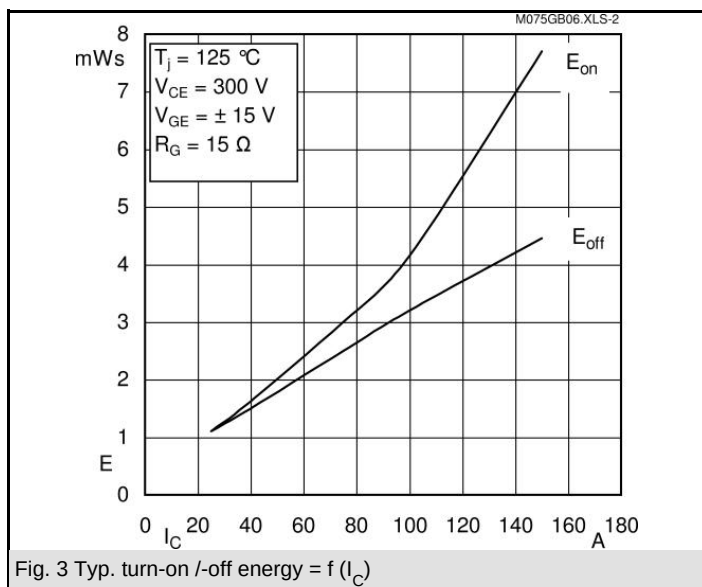
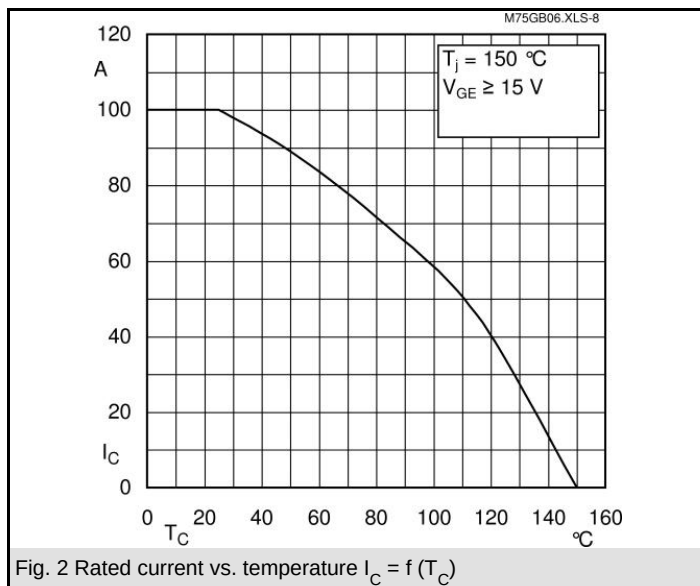
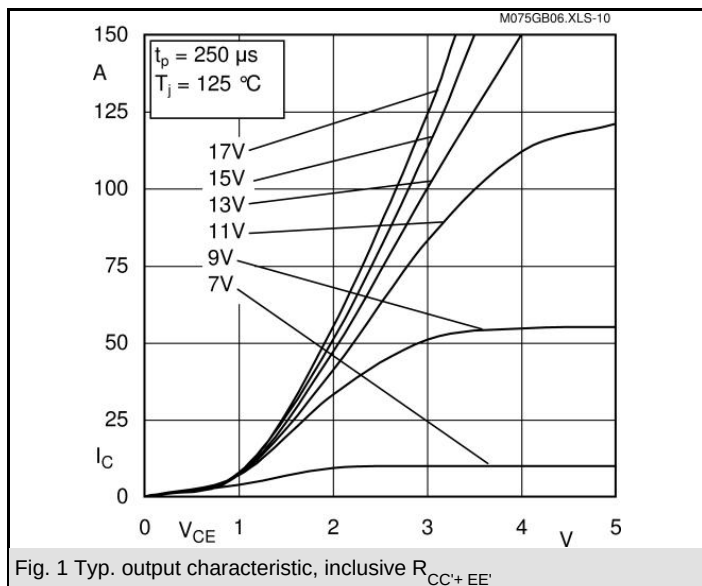
### Typical Applications

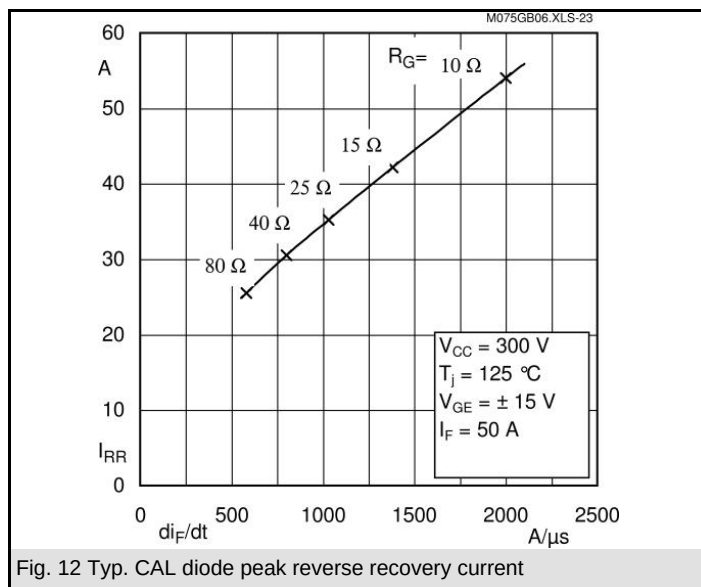
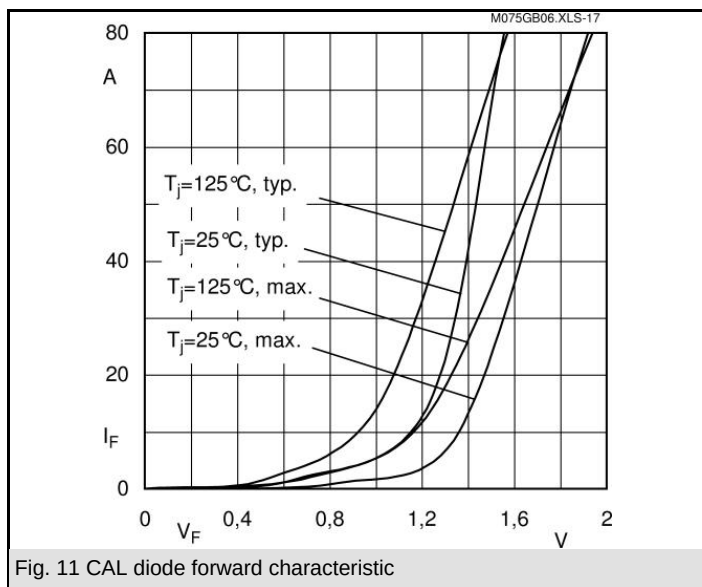
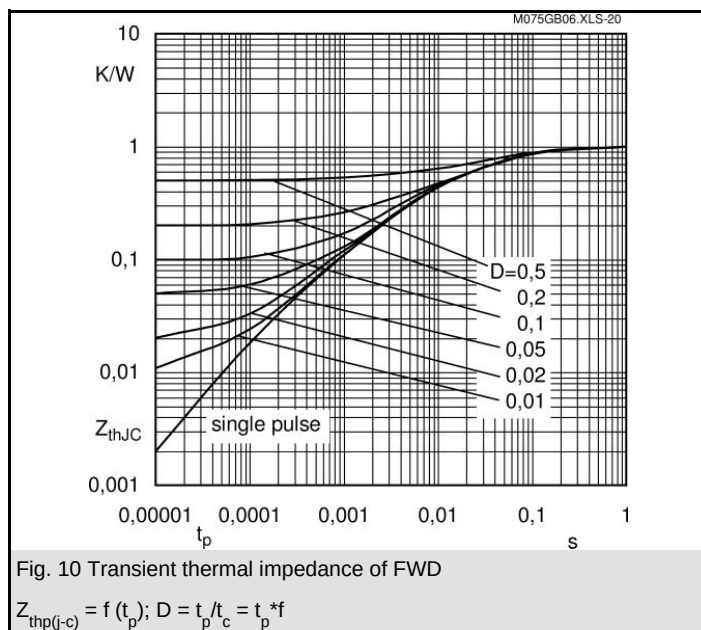
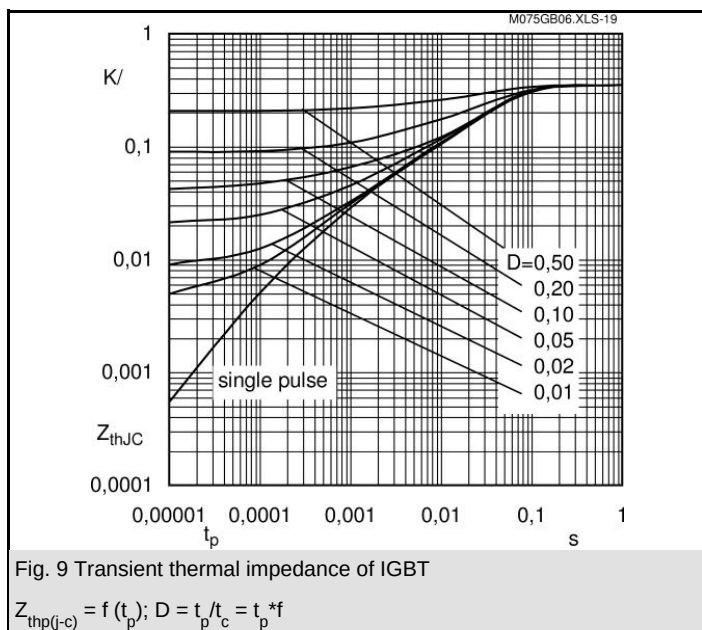
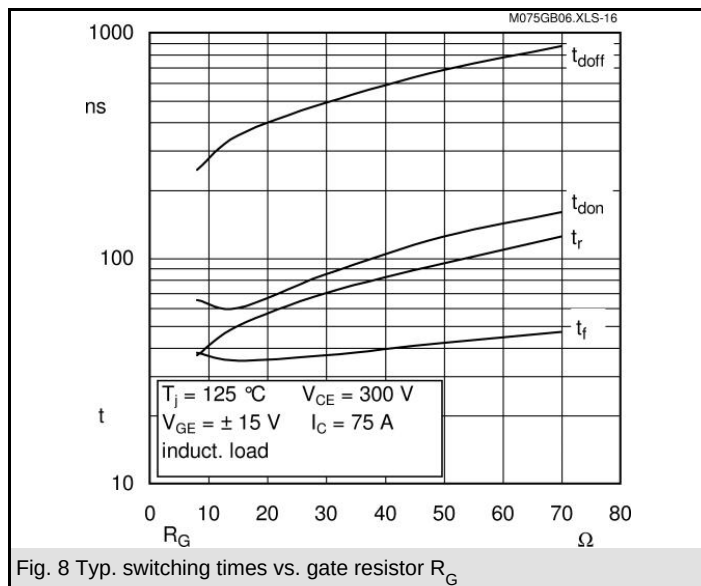
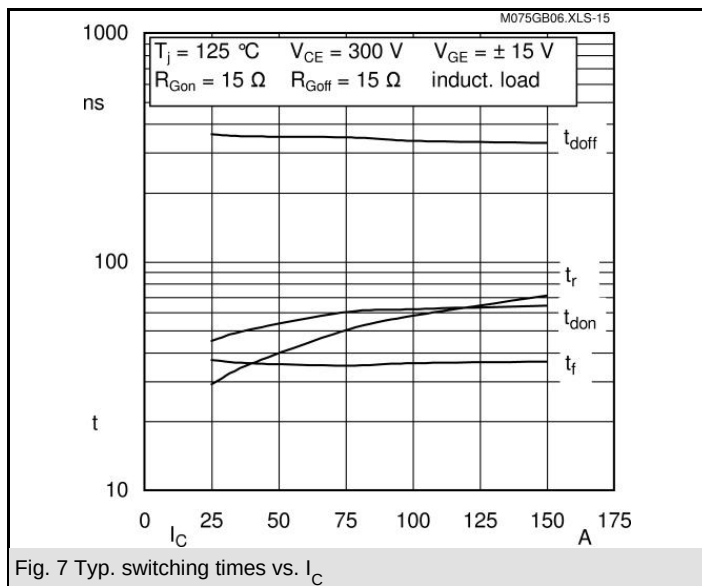
- Switching (not for linear use)
- Switched mode power supplies
- UPS
- Three phase inverters for servo / AC motor speed control
- Pulse frequencies also > 10kHz

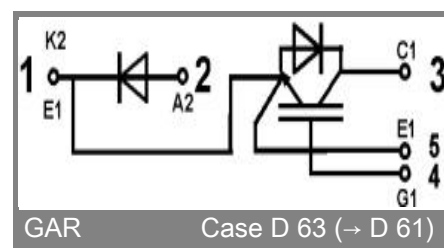
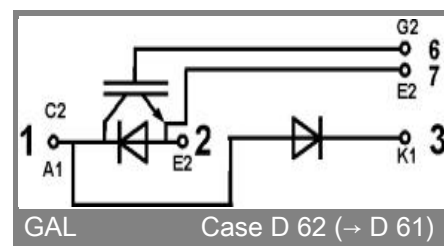
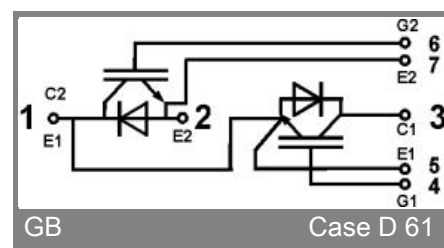
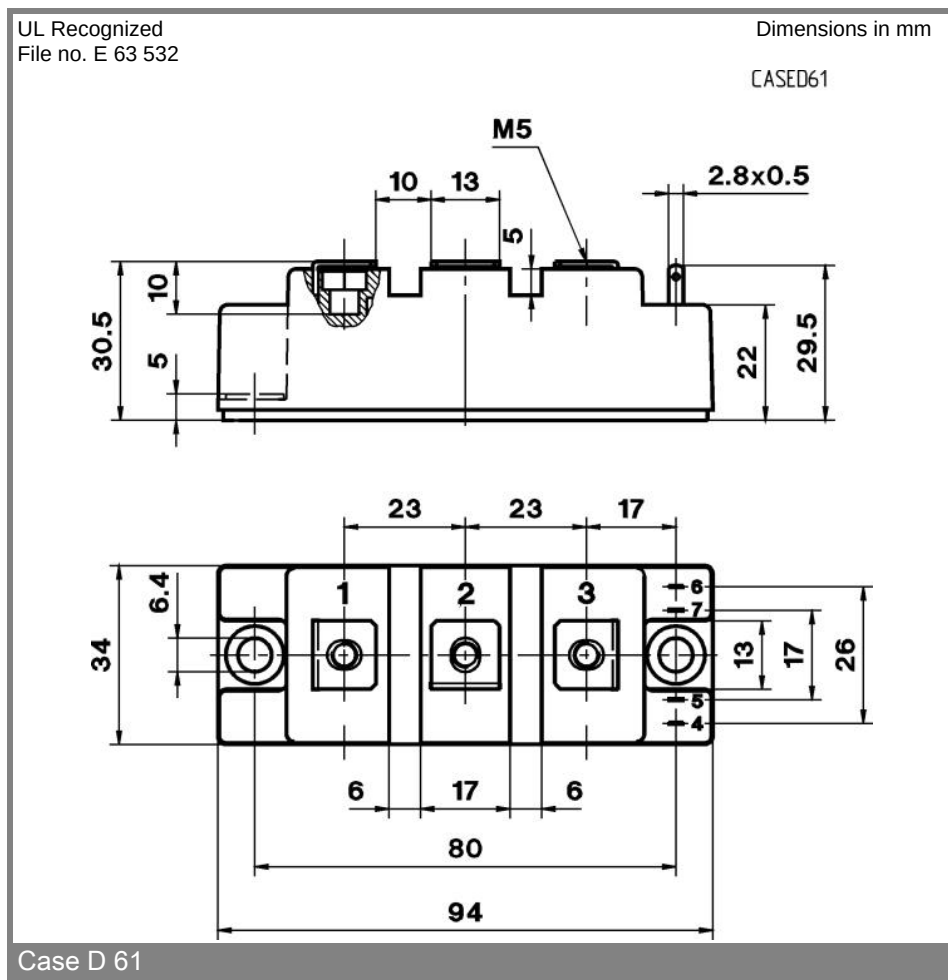
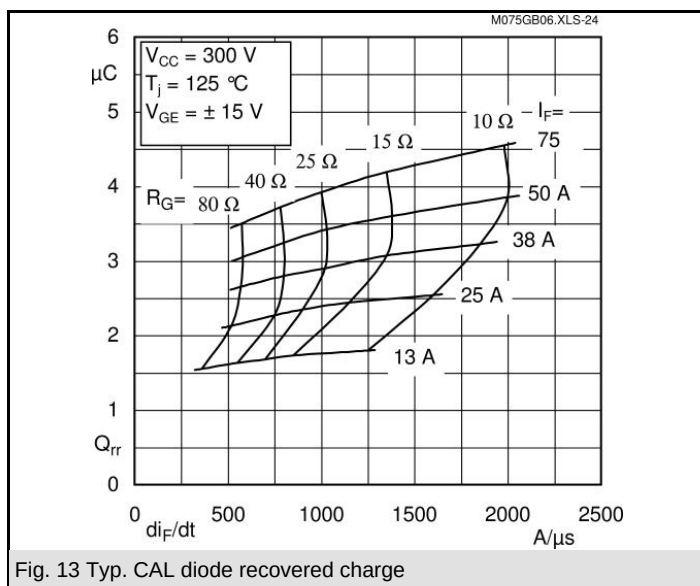


| Absolute Maximum Ratings  |                                                                | $T_c = 25\text{ }^\circ\text{C}$ , unless otherwise specified |                  |
|---------------------------|----------------------------------------------------------------|---------------------------------------------------------------|------------------|
| Symbol                    | Conditions                                                     | Values                                                        | Units            |
| <b>IGBT</b>               |                                                                |                                                               |                  |
| $V_{CES}$                 |                                                                | 600                                                           | V                |
| $I_C$                     | $T_c = 25\text{ (75) }^\circ\text{C}$                          | 100 (75)                                                      | A                |
| $I_{CRM}$                 | $t_p = 1\text{ ms}$                                            | 150                                                           | A                |
| $V_{GES}$                 |                                                                | $\pm 20$                                                      | V                |
| $T_{vj}$ , ( $T_{stg}$ )  | $T_{OPERATION} \leq T_{stg}$                                   | - 40 ... + (125) 150                                          | $^\circ\text{C}$ |
| $V_{isol}$                | AC, 1 min.                                                     | 2500                                                          | V                |
| <b>Inverse diode</b>      |                                                                |                                                               |                  |
| $I_F$                     | $T_c = 25\text{ (80) }^\circ\text{C}$                          | 75 (50)                                                       | A                |
| $I_{FRM}$                 | $t_p = 1\text{ ms}$                                            | 150                                                           | A                |
| $I_{FSM}$                 | $t_p = 10\text{ ms}$ ; sin.; $T_j = 150\text{ }^\circ\text{C}$ | 440                                                           | A                |
| <b>Freewheeling diode</b> |                                                                |                                                               |                  |
| $I_F$                     | $T_c = 25\text{ (80) }^\circ\text{C}$                          | 100 (75)                                                      | A                |
| $I_{FRM}$                 | $t_p = 1\text{ ms}$                                            | 200                                                           | A                |
| $I_{FSM}$                 | $t_p = 10\text{ ms}$ ; sin; $T_j = 150\text{ }^\circ\text{C}$  | 720                                                           | A                |

| Characteristics                |                                                                                           | $T_c = 25\text{ }^\circ\text{C}$ , unless otherwise specified |             |           |               |
|--------------------------------|-------------------------------------------------------------------------------------------|---------------------------------------------------------------|-------------|-----------|---------------|
| Symbol                         | Conditions                                                                                | min.                                                          | typ.        | max.      | Units         |
| <b>IGBT</b>                    |                                                                                           |                                                               |             |           |               |
| $V_{GE(th)}$                   | $V_{GE} = V_{CE}$ , $I_C = 1\text{ mA}$                                                   | 4,5                                                           | 5,5         | 6,5       | V             |
| $I_{CES}$                      | $V_{GE} = 0$ , $V_{CE} = V_{CES}$ , $T_j = 25\text{ (125) }^\circ\text{C}$                |                                                               | 0,1         | 0,3       | mA            |
| $V_{CE(TO)}$                   | $T_j = 25\text{ (125) }^\circ\text{C}$                                                    |                                                               | 1,05 (1)    |           | V             |
| $r_{CE}$                       | $V_{GE} = 15\text{ V}$ , $T_j = 25\text{ (125) }^\circ\text{C}$                           |                                                               | 14 (18,7)   |           | m $\Omega$    |
| $V_{CE(sat)}$                  | $I_{Cnom} = 75\text{ A}$ , $V_{GE} = 15\text{ V}$ , chip level                            |                                                               | 2,1 (2,4)   | 2,5 (2,8) | V             |
| $C_{ies}$                      | under following conditions                                                                |                                                               | 4,2         |           | nF            |
| $C_{oes}$                      | $V_{GE} = 0$ , $V_{CE} = 25\text{ V}$ , $f = 1\text{ MHz}$                                |                                                               | 0,5         |           | nF            |
| $C_{res}$                      |                                                                                           |                                                               | 0,3         |           | nF            |
| $L_{CE}$                       |                                                                                           |                                                               |             | 30        | nH            |
| $R_{CC'+EE'}$                  | res., terminal-chip $T_c = 25\text{ (125) }^\circ\text{C}$                                |                                                               | 0,75 (1)    |           | m $\Omega$    |
| $t_{d(on)}$                    | $V_{CC} = 300\text{ V}$ , $I_{Cnom} = 75\text{ A}$                                        |                                                               | 60          |           | ns            |
| $t_r$                          | $R_{Gon} = R_{Goff} = 15\text{ }\Omega$ , $T_j = 125\text{ }^\circ\text{C}$               |                                                               | 50          |           | ns            |
| $t_{d(off)}$                   | $V_{GE} = \pm 15\text{ V}$                                                                |                                                               | 350         |           | ns            |
| $t_f$                          |                                                                                           |                                                               | 35          |           | ns            |
| $E_{on} (E_{off})$             |                                                                                           |                                                               | 3 (2,5)     |           | mJ            |
| <b>Inverse diode</b>           |                                                                                           |                                                               |             |           |               |
| $V_F = V_{EC}$                 | $I_{Fnom} = 75\text{ A}$ ; $V_{GE} = 0\text{ V}$ ; $T_j = 25\text{ (125) }^\circ\text{C}$ |                                                               | 1,55 (1,55) | 1,9       | V             |
| $V_{(TO)}$                     | $T_j = 125\text{ ( ) }^\circ\text{C}$                                                     |                                                               |             | 0,9       | V             |
| $r_T$                          | $T_j = 125\text{ ( ) }^\circ\text{C}$                                                     |                                                               | 10          | 13,3      | m $\Omega$    |
| $I_{RRM}$                      | $I_{Fnom} = 75\text{ A}$ ; $T_j = 125\text{ ( ) }^\circ\text{C}$                          |                                                               | 30          |           | A             |
| $Q_{rr}$                       | $di/dt = 800\text{ A}/\mu\text{s}$                                                        |                                                               | 3,7         |           | $\mu\text{C}$ |
| $E_{rr}$                       | $V_{GE} = 0\text{ V}$                                                                     |                                                               |             |           | mJ            |
| <b>FWD</b>                     |                                                                                           |                                                               |             |           |               |
| $V_F = V_{EC}$                 | $I_F = 100\text{ A}$ ; $V_{GE} = 0\text{ V}$ , $T_j = 25\text{ (125) }^\circ\text{C}$     |                                                               | 1,55 (1,55) | 1,9       | V             |
| $V_{(TO)}$                     | $T_j = 125\text{ ( ) }^\circ\text{C}$                                                     |                                                               |             | 0,9       | V             |
| $r_T$                          | $T_j = 125\text{ ( ) }^\circ\text{C}$                                                     |                                                               | 8           | 10        | m $\Omega$    |
| $I_{RRM}$                      | $I_F = 100\text{ A}$ ; $T_j = 125\text{ ( ) }^\circ\text{C}$                              |                                                               | 44          |           | A             |
| $Q_{rr}$                       | $di/dt = 0\text{ A}/\mu\text{s}$                                                          |                                                               | 6           |           | $\mu\text{C}$ |
| $E_{rr}$                       | $V_{GE} = V$                                                                              |                                                               |             |           | mJ            |
| <b>Thermal characteristics</b> |                                                                                           |                                                               |             |           |               |
| $R_{th(j-c)}$                  | per IGBT                                                                                  |                                                               |             | 0,35      | K/W           |
| $R_{th(j-c)D}$                 | per Inverse Diode                                                                         |                                                               |             | 1         | K/W           |
| $R_{th(j-c)FD}$                | per FWD                                                                                   |                                                               |             | 0,6       | K/W           |
| $R_{th(c-s)}$                  | per module                                                                                |                                                               |             | 0,05      | K/W           |
| <b>Mechanical data</b>         |                                                                                           |                                                               |             |           |               |
| $M_s$                          | to heatsink 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.

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