



**SEMITRANS® 2**

## Superfast NPT-IGBT Module

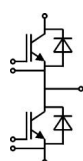
**SKM 100GB063D**

### Features

- N channel, homogeneous Silicon 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 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 above 10 kHz



**GB**

| Absolute Maximum Ratings |                                                                                                                 |                                         | $T_c = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified |                    |
|--------------------------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------|--------------------|
| Symbol                   | Conditions                                                                                                      |                                         | Values                                                          | Units              |
| IGBT                     |                                                                                                                 |                                         |                                                                 |                    |
| $V_{CES}$                | $T_j = 25\text{ }^{\circ}\text{C}$                                                                              |                                         | 600                                                             | V                  |
| $I_C$                    | $T_j = 150\text{ }^{\circ}\text{C}$                                                                             | $T_{case} = 25\text{ }^{\circ}\text{C}$ | 130                                                             | A                  |
|                          |                                                                                                                 | $T_{case} = 70\text{ }^{\circ}\text{C}$ | 100                                                             | A                  |
| $I_{CRM}$                | $I_{CRM}=2xI_{Cnom}$                                                                                            |                                         | 200                                                             | A                  |
| $V_{GES}$                |                                                                                                                 |                                         | $\pm 20$                                                        | V                  |
| $t_{psc}$                | $V_{CC} = 300\text{ V}; V_{GE} \leq 20\text{ V}; T_j = 125\text{ }^{\circ}\text{C}$<br>$V_{CES} < 600\text{ V}$ |                                         | 10                                                              | $\mu\text{s}$      |
| Inverse Diode            |                                                                                                                 |                                         |                                                                 |                    |
| $I_F$                    | $T_j = 150\text{ }^{\circ}\text{C}$                                                                             | $T_{case} = 25\text{ }^{\circ}\text{C}$ | 100                                                             | A                  |
|                          |                                                                                                                 | $T_{case} = 80\text{ }^{\circ}\text{C}$ | 75                                                              | A                  |
| $I_{FRM}$                | $I_{FRM}=2xI_{Fnom}$                                                                                            |                                         | 200                                                             | A                  |
| $I_{FSM}$                | $t_p = 10\text{ ms}; \sin.$                                                                                     | $T_j = 150\text{ }^{\circ}\text{C}$     | 720                                                             | A                  |
| Module                   |                                                                                                                 |                                         |                                                                 |                    |
| $I_{t(RMS)}$             |                                                                                                                 |                                         | 200                                                             | A                  |
| $T_{vj}$                 |                                                                                                                 |                                         | - 40 ... + 150                                                  | $^{\circ}\text{C}$ |
| $T_{stg}$                |                                                                                                                 |                                         | - 40 ... + 125                                                  | $^{\circ}\text{C}$ |
| $V_{isol}$               | AC, 1 min.                                                                                                      |                                         | 2500                                                            | V                  |

| Characteristics      |                                                           |                                                    | T <sub>c</sub> = 25 °C, unless otherwise specified |      |      |       |
|----------------------|-----------------------------------------------------------|----------------------------------------------------|----------------------------------------------------|------|------|-------|
| Symbol               | Conditions                                                |                                                    | min.                                               | typ. | max. | Units |
| IGBT                 |                                                           |                                                    |                                                    |      |      |       |
| V <sub>GE(th)</sub>  | V <sub>GE</sub> = V <sub>CE</sub> , I <sub>C</sub> = 2 mA |                                                    | 4,5                                                | 5,5  | 6,5  | V     |
| I <sub>CES</sub>     | V <sub>GE</sub> = 0 V, V <sub>CE</sub> = V <sub>CES</sub> | T <sub>J</sub> = 25 °C                             |                                                    | 0,1  | 0,3  | mA    |
| V <sub>CE0</sub>     |                                                           | T <sub>J</sub> = 25 °C                             |                                                    | 1,05 |      | V     |
|                      |                                                           | T <sub>J</sub> = 125 °C                            |                                                    | 1    |      | V     |
| r <sub>CE</sub>      | V <sub>GE</sub> = 15 V                                    | T <sub>J</sub> = 25°C                              |                                                    | 10,5 |      | mΩ    |
|                      |                                                           | T <sub>J</sub> = 125°C                             |                                                    | 14   |      | mΩ    |
| V <sub>CE(sat)</sub> | I <sub>Cnom</sub> = 100 A, V <sub>GE</sub> = 15 V         | T <sub>J</sub> = 25°C <sub>chiplev.</sub>          |                                                    | 2,1  | 2,5  | V     |
|                      |                                                           | T <sub>J</sub> = 125°C <sub>chiplev.</sub>         |                                                    | 2,4  | 2,8  | V     |
| C <sub>ies</sub>     | V <sub>CE</sub> = 25, V <sub>GE</sub> = 0 V               | f = 1 MHz                                          |                                                    | 5,6  |      | nF    |
| C <sub>oes</sub>     |                                                           |                                                    |                                                    | 0,6  |      | nF    |
| C <sub>res</sub>     |                                                           |                                                    |                                                    | 0,4  |      | nF    |
| Q <sub>G</sub>       | V <sub>GE</sub> = 0V - +15V                               |                                                    |                                                    | 240  |      | nC    |
| R <sub>Gint</sub>    | T <sub>J</sub> = °C                                       |                                                    |                                                    | 0    |      | Ω     |
| t <sub>d(on)</sub>   | R <sub>Gon</sub> = 10 Ω                                   | V <sub>CC</sub> = 300V<br>I <sub>C</sub> = 100A    |                                                    | 50   |      | ns    |
| t <sub>r</sub>       |                                                           |                                                    |                                                    | 40   |      | ns    |
| E <sub>on</sub>      |                                                           |                                                    |                                                    | 4    |      | mJ    |
| t <sub>d(off)</sub>  | R <sub>Goff</sub> = 10 Ω                                  | T <sub>J</sub> = 125 °C<br>V <sub>GE</sub> = ±15 V |                                                    | 300  |      | ns    |
| t <sub>f</sub>       |                                                           |                                                    |                                                    | 35   |      | ns    |
| E <sub>off</sub>     |                                                           |                                                    |                                                    | 3    |      | mJ    |
| R <sub>th(j-c)</sub> | per IGBT                                                  |                                                    |                                                    |      | 0,27 | K/W   |

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Superfast NPT-IGBT  
Module

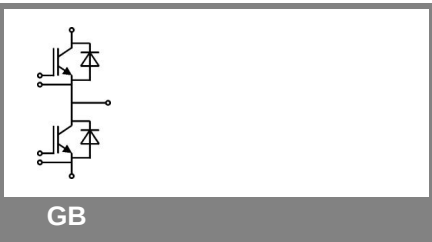
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| Characteristics |                                                   |      |      |      |       |
|-----------------|---------------------------------------------------|------|------|------|-------|
| Symbol          | Conditions                                        | min. | typ. | max. | Units |
| Inverse Diode   |                                                   |      |      |      |       |
| $V_F = V_{EC}$  | $I_{Fnom} = 100\text{ A}$ ; $V_{GE} = 0\text{ V}$ |      |      |      |       |
|                 | $T_j = 25\text{ }^{\circ}\text{C}_{chiplev.}$     |      | 1,55 | 1,9  | V     |
|                 | $T_j = 125\text{ }^{\circ}\text{C}_{chiplev.}$    |      | 1,55 |      | V     |
| $V_{F0}$        | $T_j = 125\text{ }^{\circ}\text{C}$               |      |      | 0,9  | V     |
| $r_F$           | $T_j = 125\text{ }^{\circ}\text{C}$               |      | 8    | 10   | mΩ    |
| $I_{RRM}$       | $I_F = 100\text{ A}$                              |      | 44   |      | A     |
| $Q_{rr}$        |                                                   |      | 6    |      | μC    |
| $E_{rr}$        | $V_{GE} = -15\text{ V}$ ; $V_{CC} = 300\text{ V}$ |      |      |      | mJ    |
| $R_{th(j-c)D}$  | per diode                                         |      |      | 0,6  | K/W   |
| Module          |                                                   |      |      |      |       |
| $L_{CE}$        |                                                   |      |      | 30   | nH    |
| $R_{CC'+EE'}$   | res., terminal-chip                               |      | 0,75 |      | mΩ    |
|                 | $T_{case} = 25\text{ }^{\circ}\text{C}$           |      | 1    |      | mΩ    |
|                 | $T_{case} = 125\text{ }^{\circ}\text{C}$          |      |      |      |       |
| $R_{th(c-s)}$   | 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.

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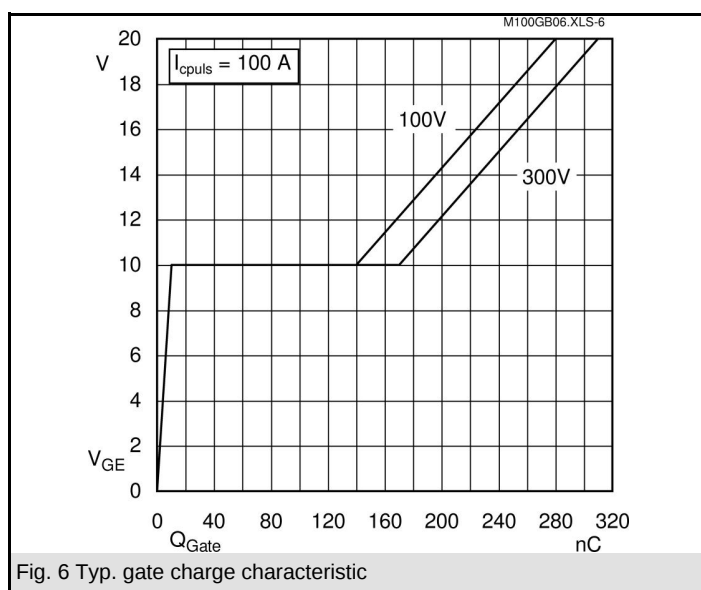
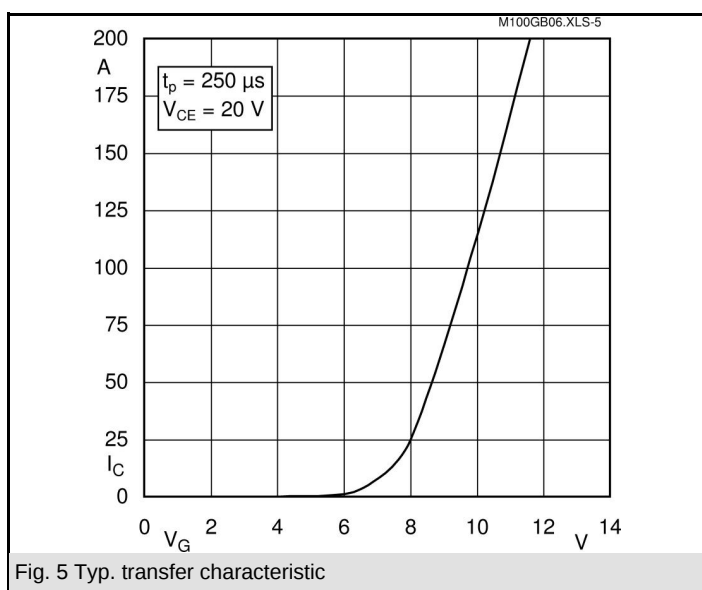
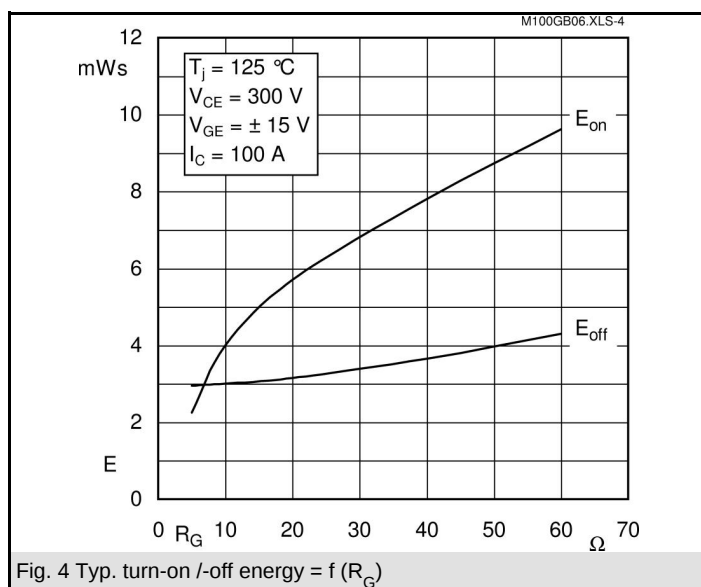
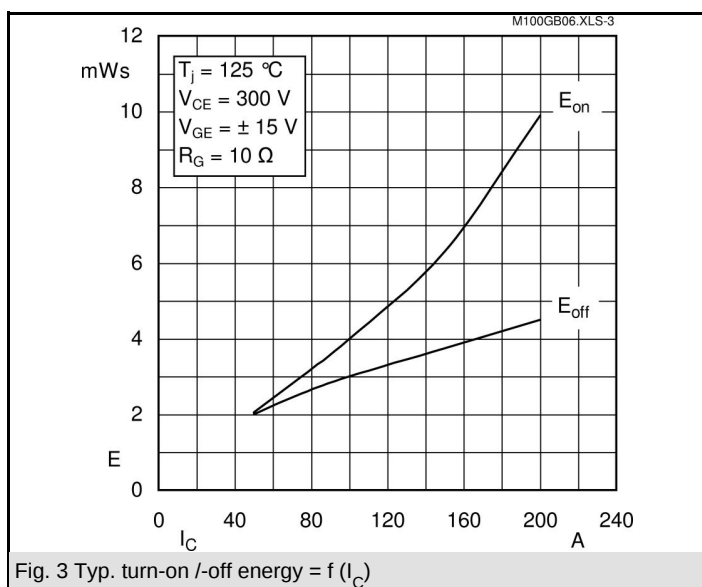
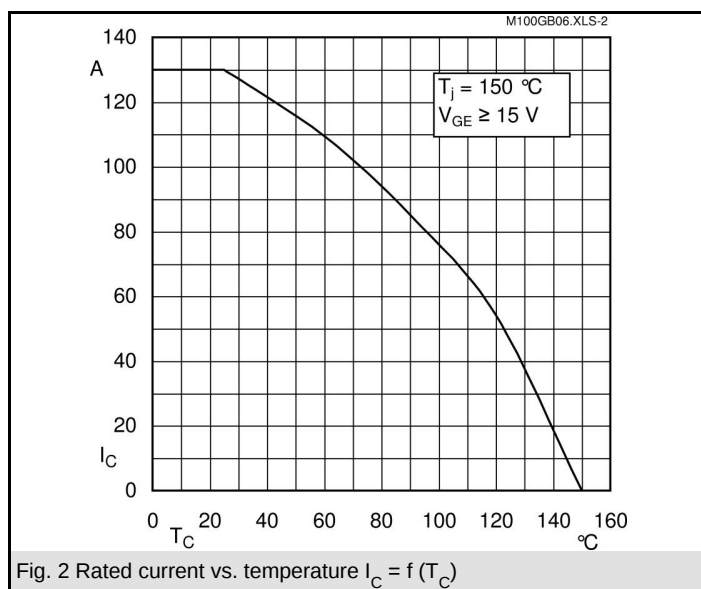
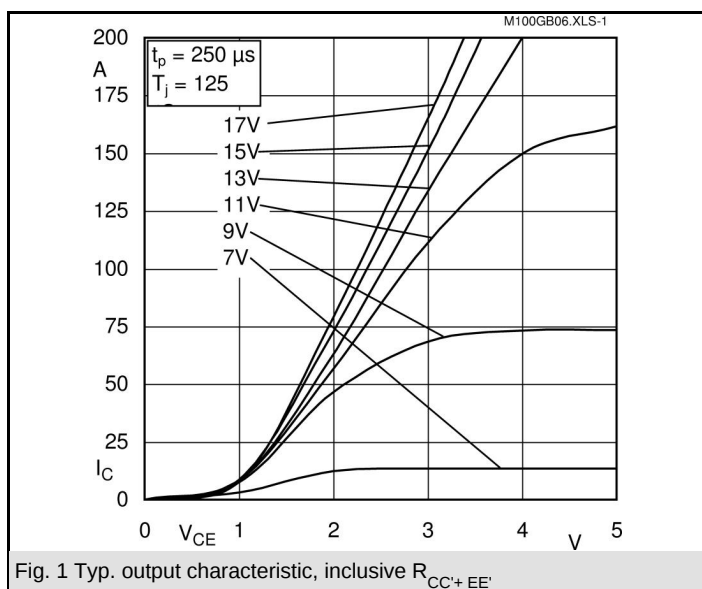
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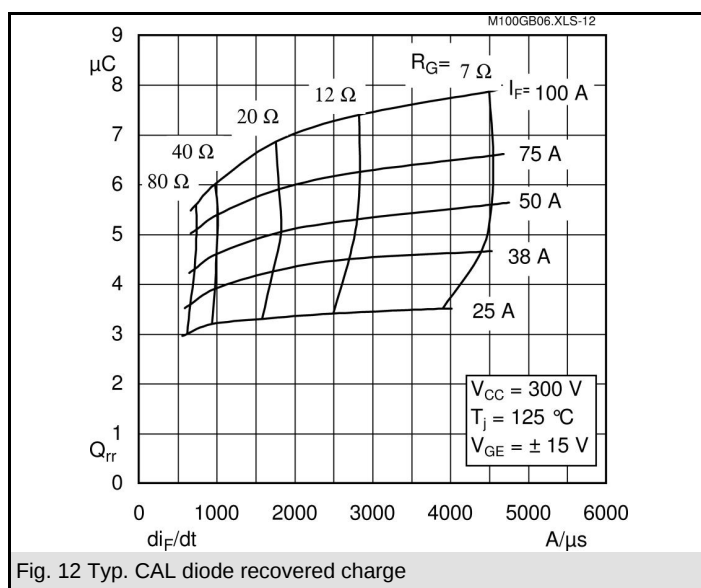
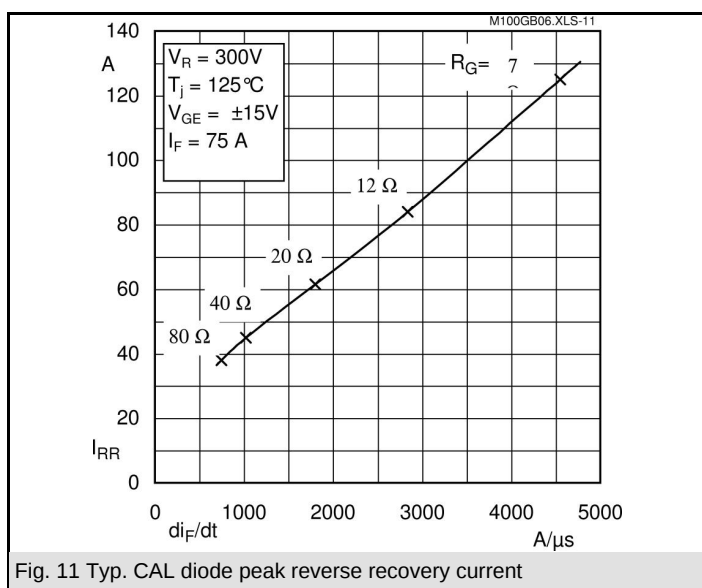
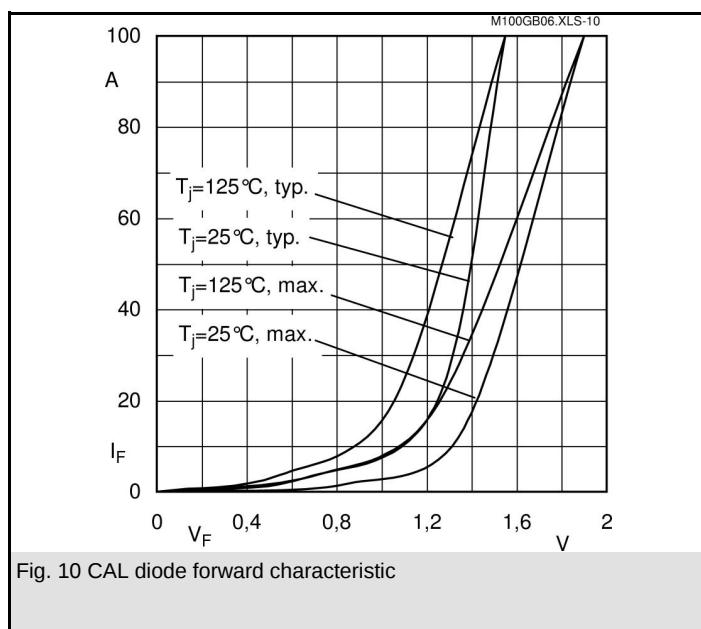
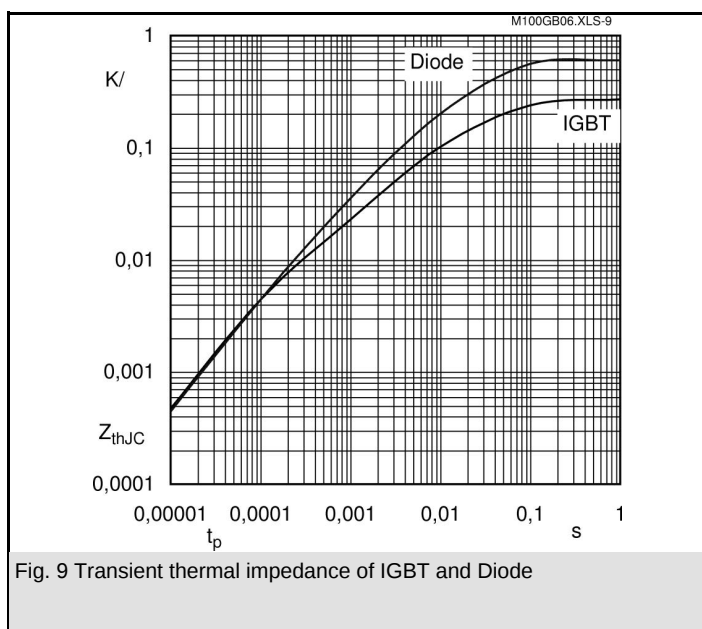
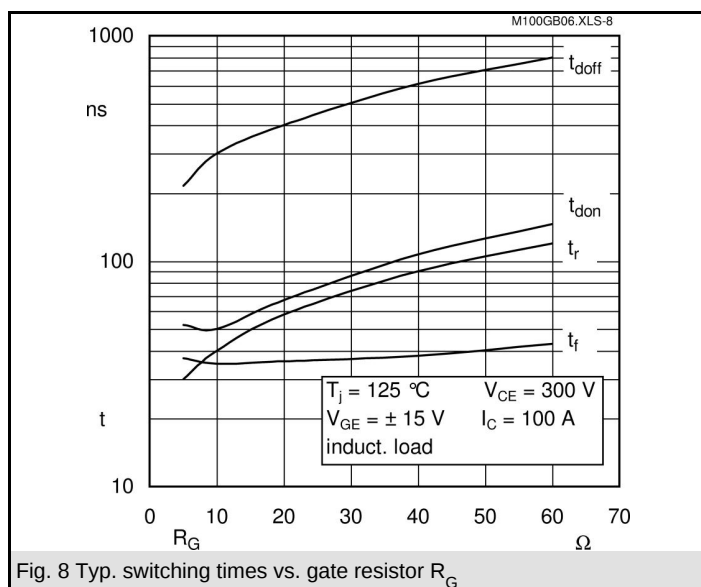
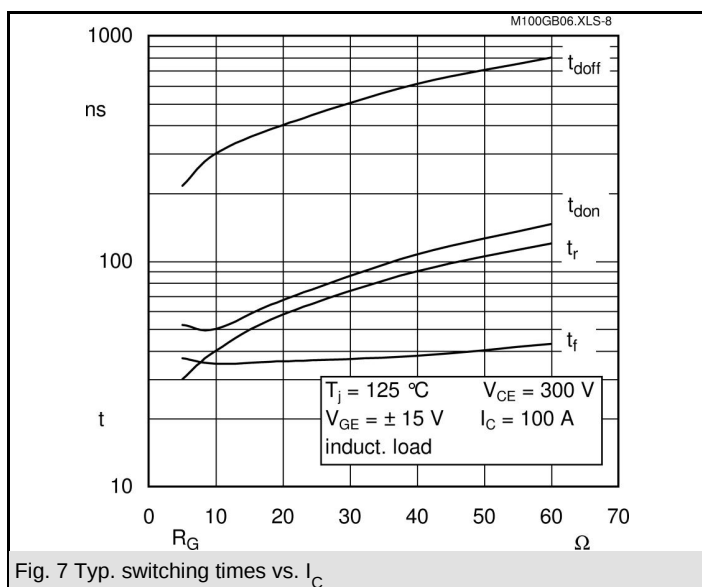
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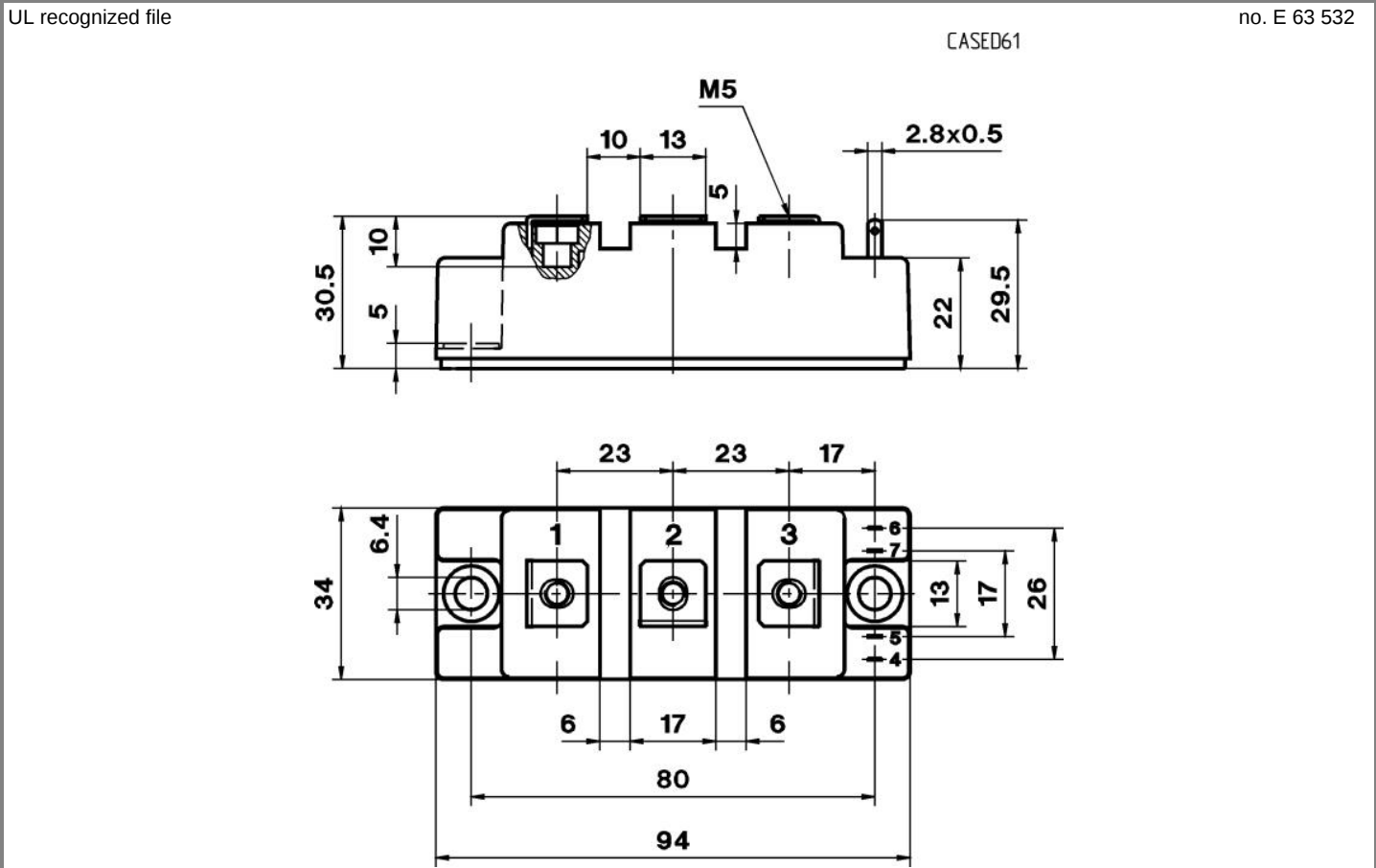
GB

| $Z_{th}$       |            |        |       |
|----------------|------------|--------|-------|
| Symbol         | Conditions | Values | Units |
| $Z_{th(j-c)I}$ |            |        |       |
| $R_i$          | $i = 1$    | 160    | mk/W  |
| $R_i$          | $i = 2$    | 88     | mk/W  |
| $R_i$          | $i = 3$    | 18     | mk/W  |
| $R_i$          | $i = 4$    | 4      | mk/W  |
| $\tau_{ui}$    | $i = 1$    | 0,0447 | s     |
| $\tau_{ui}$    | $i = 2$    | 0,0087 | s     |
| $\tau_{ui}$    | $i = 3$    | 0,0015 | s     |
| $\tau_{ui}$    | $i = 4$    | 0,0002 | s     |
| $Z_{th(j-c)D}$ |            |        |       |
| $R_i$          | $i = 1$    | 400    | mk/W  |
| $R_i$          | $i = 2$    | 165    | mk/W  |
| $R_i$          | $i = 3$    | 30,5   | mk/W  |
| $R_i$          | $i = 4$    | 4,5    | mk/W  |
| $\tau_{ui}$    | $i = 1$    | 0,0613 | s     |
| $\tau_{ui}$    | $i = 2$    | 0,0085 | s     |
| $\tau_{ui}$    | $i = 3$    | 0,0045 | s     |
| $\tau_{ui}$    | $i = 4$    | 0,0003 | s     |





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Case D 61

