



SEMITRANS® 3

Trench IGBT Module

SKM 600GB126D

SKM 600GAL126D

Preliminary Data

Features

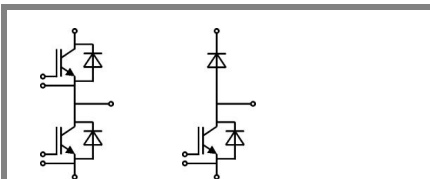
- Trench = Trenchgate technology
- V_{CEsat} with positive temperature coefficient
- High short circuit capability, self limiting to $6 \times I_C$

Typical Applications

- AC inverter drives
- UPS
- Electronic welders

Remarks

- $I_{DC} \leq 500A$ for $T_{Terminal} = 100^\circ C$

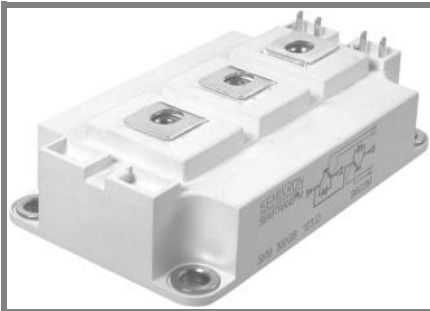


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| Absolute Maximum Ratings | | $T_c = 25^\circ C$, unless otherwise specified | | |
|---------------------------|---|---|------|------------|
| Symbol | Conditions | Values | | Units |
| IGBT | | | | |
| V_{CES} | $T_j = 25^\circ C$ | 1200 | | V |
| I_C | $T_j = 150^\circ C$ | $T_c = 25^\circ C$ | 660 | A |
| | | $T_c = 80^\circ C$ | 460 | A |
| I_{CRM} | $I_{CRM} = 2 \times I_{Cnom}$ | 800 | | A |
| V_{GES} | | ± 20 | | V |
| t_{psc} | $V_{CC} = 600 V$; $V_{GE} \leq 20 V$; $T_j = 125^\circ C$ $V_{CES} < 1200 V$ | 10 | | μs |
| Inverse Diode | | | | |
| I_F | $T_j = 150^\circ C$ | $T_c = 25^\circ C$ | 490 | A |
| | | $T_c = 80^\circ C$ | 340 | A |
| I_{FRM} | $I_{FRM} = 2 \times I_{Fnom}$ | 800 | | A |
| I_{FSM} | $t_p = 10 ms$; sin. | $T_j = 150^\circ C$ | 2880 | A |
| Freewheeling Diode | | | | |
| I_F | $T_j = 150^\circ C$ | $T_c = 25^\circ C$ | 490 | A |
| | | $T_c = 80^\circ C$ | 340 | A |
| I_{FRM} | $I_{FRM} = 2 \times I_{Fnom}$ | 800 | | A |
| I_{FSM} | $t_p = 10 ms$; sin. | $T_j = 150^\circ C$ | 2880 | A |
| Module | | | | |
| $I_{t(RMS)}$ | | 500 | | A |
| T_{vj} | | - 40 ... + 150 | | $^\circ C$ |
| T_{stg} | | - 40 ... + 125 | | $^\circ C$ |
| V_{isol} | AC, 1 min. | 4000 | | V |

| Characteristics | | $T_c = 25^\circ C$, unless otherwise specified | | | |
|-----------------|--------------------------------------|---|---------------------|----------|-----------|
| Symbol | Conditions | min. | typ. | max. | Units |
| IGBT | | | | | |
| $V_{GE(th)}$ | $V_{GE} = V_{CE}$, $I_C = 16 mA$ | 5 | 5,8 | 6,5 | V |
| I_{CES} | $V_{GE} = 0 V$, $V_{CE} = V_{CES}$ | $T_j = 25^\circ C$ | 0,2 | 0,6 | mA |
| | | $T_j = 125^\circ C$ | | | mA |
| V_{CE0} | | $T_j = 25^\circ C$ | 1 | 1,2 | V |
| | | $T_j = 125^\circ C$ | 0,9 | 1,1 | V |
| r_{CE} | $V_{GE} = 15 V$ | $T_j = 25^\circ C$ | 1,8 | 2,4 | $m\Omega$ |
| | | $T_j = 125^\circ C$ | 2,8 | 3,4 | $m\Omega$ |
| $V_{CE(sat)}$ | $I_{Cnom} = 400 A$, $V_{GE} = 15 V$ | $T_j = 25^\circ C_{chiplev.}$ | 1,7 | 2,15 | V |
| | | $T_j = 125^\circ C_{chiplev.}$ | 2 | 2,45 | V |
| C_{ies} | $V_{CE} = 25$, $V_{GE} = 0 V$ | $f = 1 MHz$ | 32 | | nF |
| C_{oes} | | | 11 | | nF |
| C_{res} | | | 2,2 | | nF |
| Q_G | $V_{GE} = -8V - +20V$ | 3600 | | nC | |
| R_{Gint} | $T_j = ^\circ C$ | 1,88 | | Ω | |
| $t_{d(on)}$ | $R_{Gon} = 2 \Omega$ | $V_{CC} = 600V$ $I_{Cnom} = 400A$ | 290 | | ns |
| | | | $T_j = 125^\circ C$ | 60 | ns |
| t_r | $R_{Goff} = 2 \Omega$ | $V_{GE} = \pm 15V$ | 39 | | mJ |
| E_{on} | | | 670 | | ns |
| $t_{d(off)}$ | | | 80 | | ns |
| t_f | | | 64 | | mJ |
| E_{off} | | | 0,055 | | K/W |
| $R_{th(j-c)}$ | per IGBT | | | | |



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Typical Applications

- AC inverter drives
- UPS
- Electronic welders

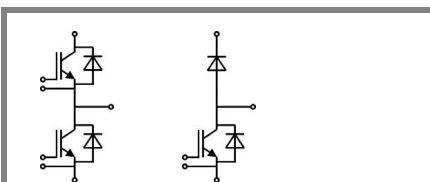
Remarks

- $I_{DC} \leq 500A$ for $T_{Terminal} = 100\text{ °C}$

| Characteristics | | | | min. | typ. | max. | Units |
|---------------------------|---|----------------------------------|--|------|-------|------|-------|
| Symbol | Conditions | | | | | | |
| Inverse diode | | | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom} = 400\text{ A}$; $V_{GE} = 0\text{ V}$ | $T_j = 25\text{ °C}_{chiplev.}$ | | 1,6 | 1,8 | | V |
| | | $T_j = 125\text{ °C}_{chiplev.}$ | | 1,6 | 1,8 | | V |
| V_{F0} | | $T_j = 25\text{ °C}$ | | 1 | 1,1 | | V |
| | | $T_j = 125\text{ °C}$ | | 0,8 | 0,9 | | V |
| r_F | | $T_j = 25\text{ °C}$ | | 1,5 | 1,8 | | mΩ |
| | | $T_j = 125\text{ °C}$ | | 2 | 2,3 | | mΩ |
| I_{RRM} | $I_{Fnom} = 400\text{ A}$ | $T_j = 125\text{ °C}$ | | 475 | | | A |
| Q_{rr} | $di/dt = 7600\text{ A}/\mu\text{s}$ | | | 96 | | | μC |
| E_{rr} | $V_{GE} = -15\text{ V}$; $V_{CC} = 600\text{ V}$ | | | 41 | | | mJ |
| $R_{th(j-c)D}$ | per diode | | | | 0,125 | | K/W |
| Freewheeling Diode | | | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom} = 400\text{ A}$; $V_{GE} = 0\text{ V}$ | $T_j = 25\text{ °C}_{chiplev.}$ | | 1,6 | 1,8 | | V |
| | | $T_j = 125\text{ °C}_{chiplev.}$ | | 1,6 | 1,8 | | V |
| V_{F0} | | $T_j = 25\text{ °C}$ | | 1 | 1,1 | | V |
| | | $T_j = 125\text{ °C}$ | | 0,8 | 0,9 | | V |
| r_F | | $T_j = 25\text{ °C}$ | | 1,5 | 1,8 | | V |
| | | $T_j = 125\text{ °C}$ | | 2 | 2,3 | | V |
| I_{RRM} | $I_{Fnom} = 400\text{ A}$ | $T_j = 125\text{ °C}$ | | 475 | | | A |
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| E_{rr} | $V_{GE} = -15\text{ V}$; $V_{CC} = 600\text{ V}$ | | | 41 | | | mJ |
| $R_{th(j-c)FD}$ | per diode | | | | 0,125 | | K/W |
| Module | | | | | | | |
| L_{CE} | | | | 15 | 20 | | nH |
| $R_{CC'+EE'}$ | res., terminal-chip | $T_{case} = 25\text{ °C}$ | | 0,35 | | | mΩ |
| | | $T_{case} = 125\text{ °C}$ | | 0,5 | | | mΩ |
| $R_{th(c-s)}$ | per module | | | | 0,038 | | K/W |
| M_s | to heat sink M6 | | | 3 | 5 | | Nm |
| M_t | to terminals M6 | | | 2,5 | 5 | | Nm |
| w | | | | | 325 | | g |

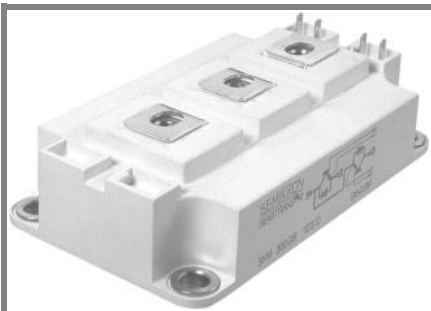
This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX.

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability.



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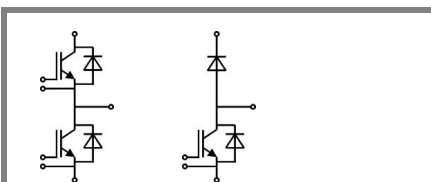
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- AC inverter drives
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Remarks

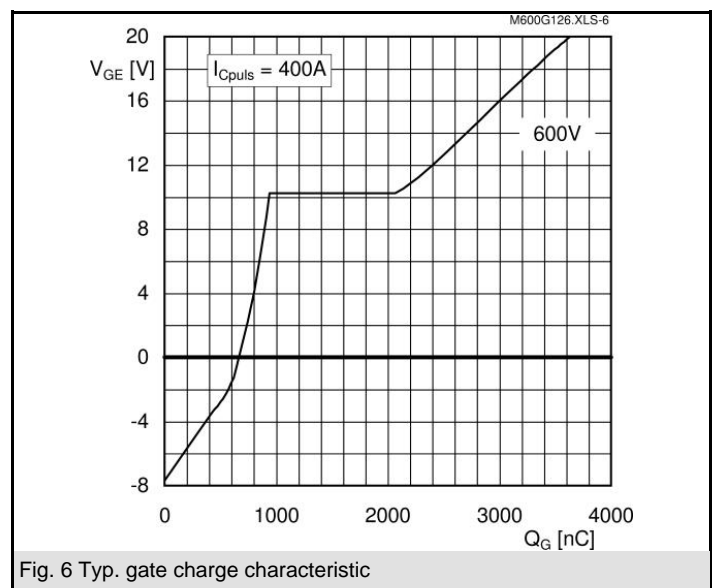
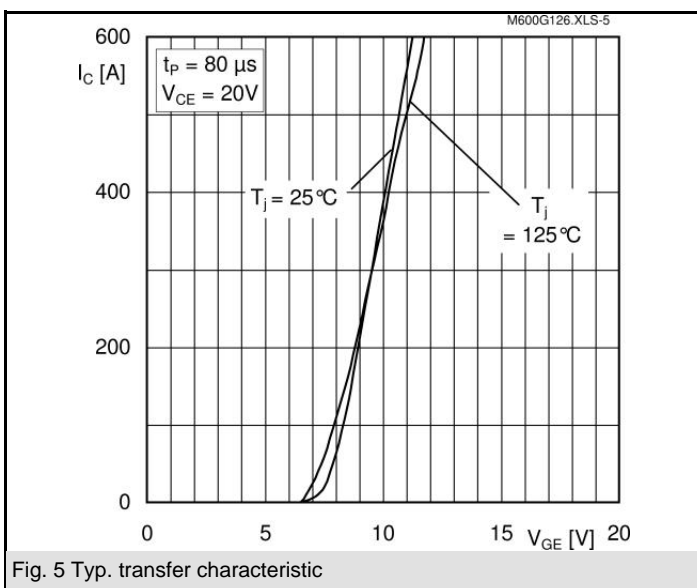
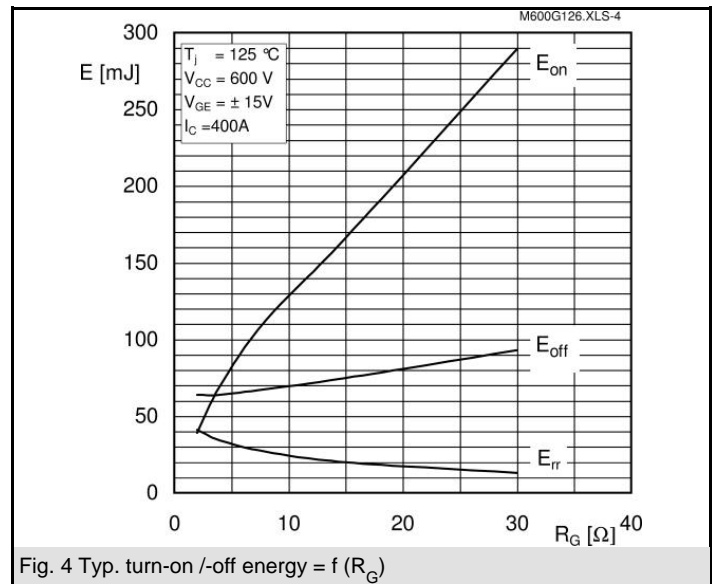
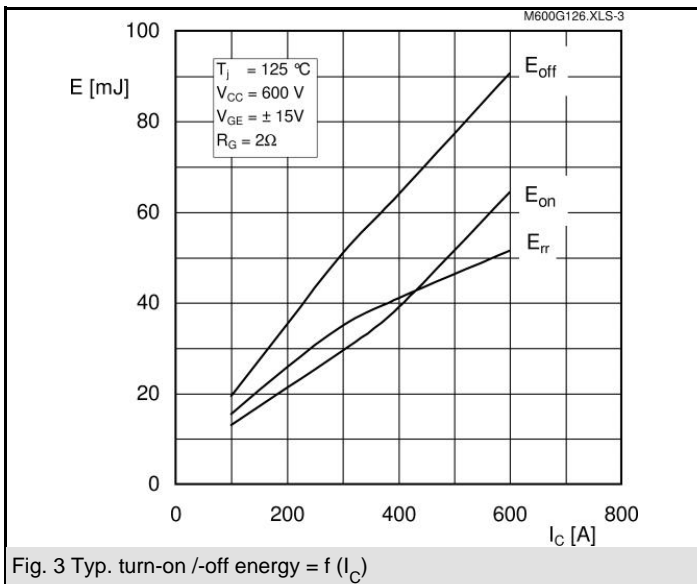
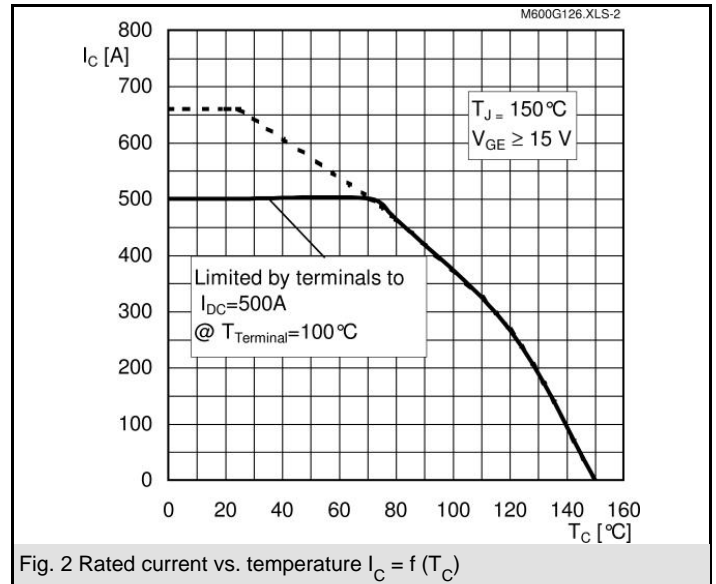
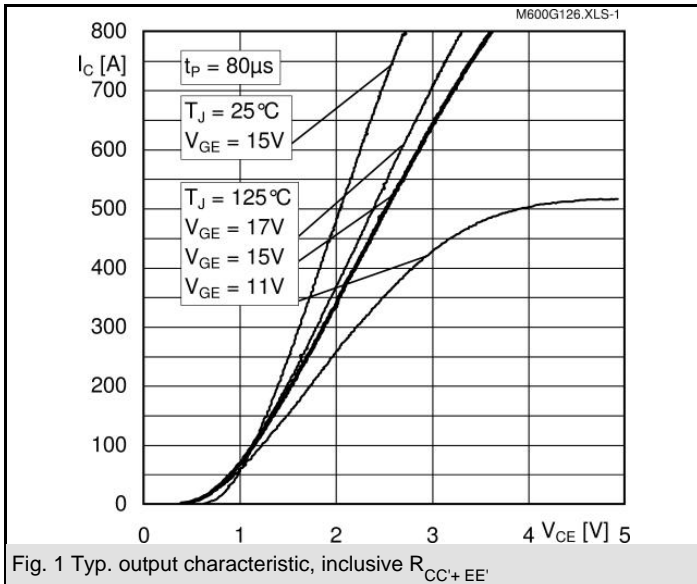
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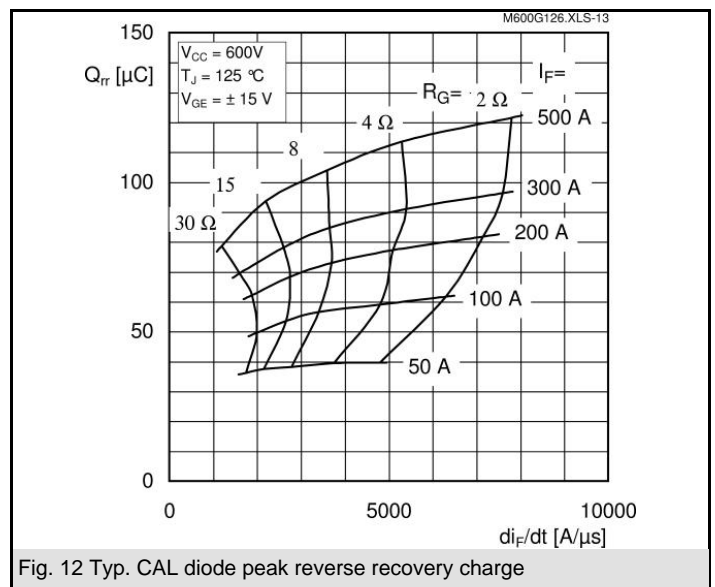
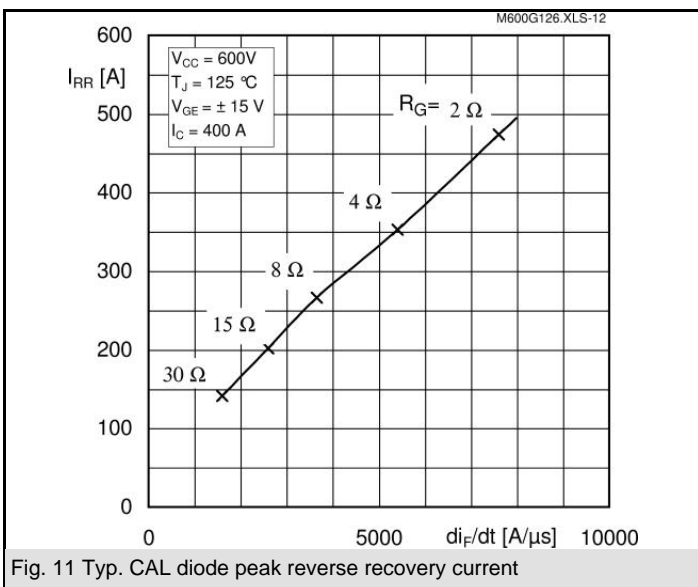
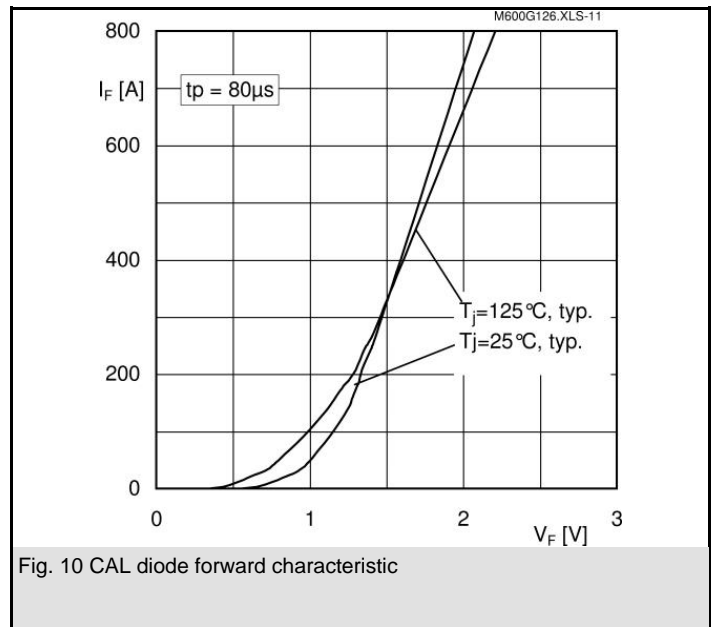
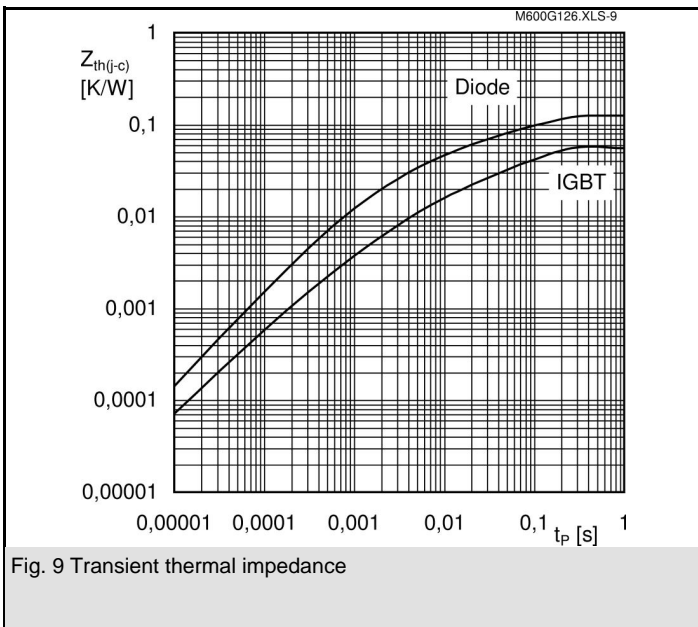
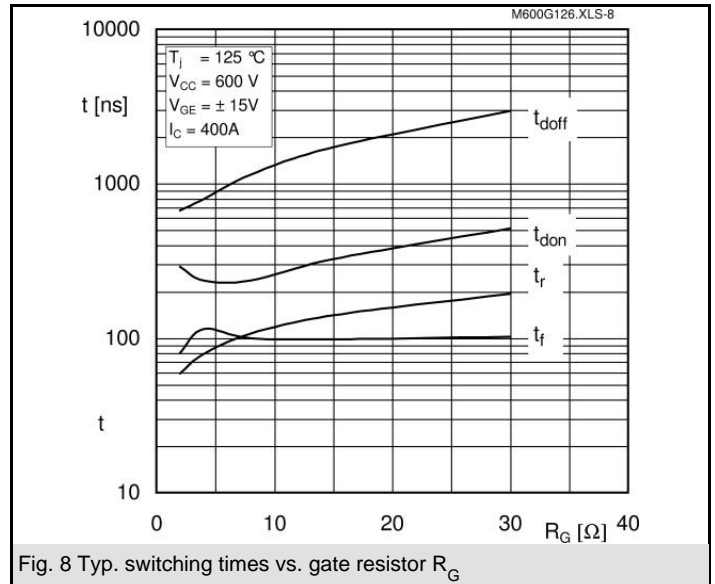
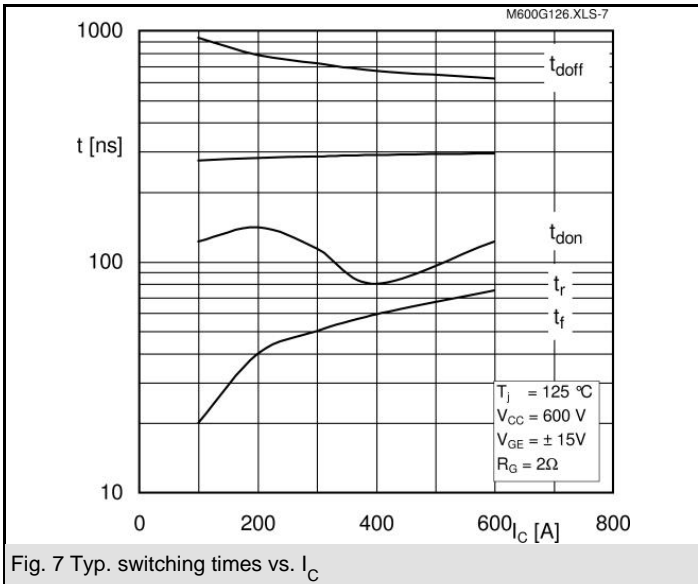
| Z_{th} | | Conditions | Values | Units |
|----------------------------------|--|------------|--------|-------|
| $Z_{th(j-c)I}$ | | | | |
| $R_{\theta j-c}$ | | $i = 1$ | 38 | mk/W |
| $R_{\theta j-c}$ | | $i = 2$ | 13 | mk/W |
| $R_{\theta j-c}$ | | $i = 3$ | 3,4 | mk/W |
| $R_{\theta j-c}$ | | $i = 4$ | 0,6 | mk/W |
| $\tau_{\theta j-c}$ | | $i = 1$ | 0,0836 | s |
| $\tau_{\theta j-c}$ | | $i = 2$ | 0,009 | s |
| $\tau_{\theta j-c}$ | | $i = 3$ | 0,0024 | s |
| $\tau_{\theta j-c}$ | | $i = 4$ | 0,0002 | s |
| $Z_{th(j-c)D}$ | | | | |
| $R_{\theta j-cD}$ | | $i = 1$ | 75 | mk/W |
| $R_{\theta j-cD}$ | | $i = 2$ | 39 | mk/W |
| $R_{\theta j-cD}$ | | $i = 3$ | 9,5 | mk/W |
| $R_{\theta j-cD}$ | | $i = 4$ | 1,5 | mk/W |
| $\tau_{\theta j-cD}$ | | $i = 1$ | 0,0327 | s |
| $\tau_{\theta j-cD}$ | | $i = 2$ | 0,0101 | s |
| $\tau_{\theta j-cD}$ | | $i = 3$ | 0,002 | s |
| $\tau_{\theta j-cD}$ | | $i = 4$ | 0,0003 | s |



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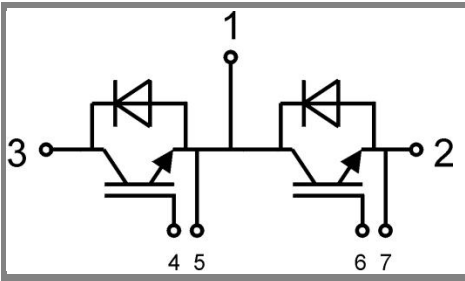
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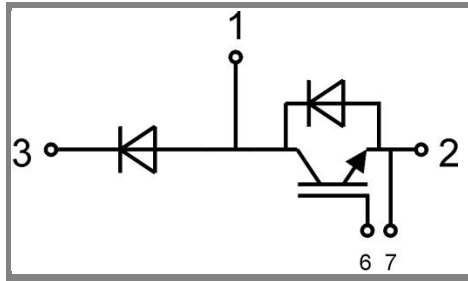




Case D 56



GB Case D 56



GAL Case D 57