

SKM 400GB126D ...



SEMITRANS® 3

Trench IGBT Module

SKM 400GB126D

SKM 400GAL126D

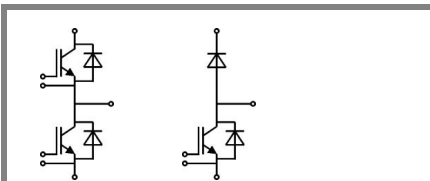
Preliminary Data

Features

- Homogeneous Si
- 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



GB

GAL

| Absolute Maximum Ratings | | $T_c = 25^\circ\text{C}$, unless otherwise specified | | |
|---------------------------|---|---|------|------------------|
| Symbol | Conditions | Values | | Units |
| IGBT | | | | |
| V_{CES} | $T_j = 25^\circ\text{C}$ | 1200 | | V |
| I_C | $T_j = 150^\circ\text{C}$ | $T_{case} = 25^\circ\text{C}$ | 470 | A |
| | | $T_{case} = 80^\circ\text{C}$ | 330 | A |
| I_{CRM} | $I_{CRM} = 2 \times I_{Cnom}$ | 600 | | A |
| V_{GES} | | ± 20 | | V |
| t_{psc} | $V_{CC} = 600\text{V}; V_{GE} \leq 20\text{V}; T_j = 125^\circ\text{C}$ $V_{CES} < 1200\text{V}$ | 10 | | μs |
| Inverse Diode | | | | |
| I_F | $T_j = 150^\circ\text{C}$ | $T_{case} = 25^\circ\text{C}$ | 400 | A |
| | | $T_{case} = 80^\circ\text{C}$ | 270 | A |
| I_{FRM} | $I_{FRM} = 2 \times I_{Fnom}$ | 600 | | A |
| I_{FSM} | $t_p = 10\text{ms}; \text{sin.}$ | $T_j = 150^\circ\text{C}$ | 2200 | A |
| Freewheeling Diode | | | | |
| I_F | $T_j = 150^\circ\text{C}$ | $T_{case} = 25^\circ\text{C}$ | 400 | A |
| | | $T_{case} = 80^\circ\text{C}$ | 270 | A |
| I_{FRM} | $I_{FRM} = 2 \times I_{Fnom}$ | 600 | | A |
| I_{FSM} | $t_p = 10\text{ms}; \text{sin.}$ | $T_j = 150^\circ\text{C}$ | 2200 | A |
| Module | | | | |
| $I_{t(RMS)}$ | | 500 | | A |
| T_{vj} | | - 40 ... + 150 | | $^\circ\text{C}$ |
| T_{stg} | | - 40 ... + 125 | | $^\circ\text{C}$ |
| V_{isol} | AC, 1 min. | 4000 | | V |

| Characteristics | | $T_c = 25^\circ\text{C}$, unless otherwise specified | | | |
|-----------------|---|---|---------------------------|----------|------------|
| Symbol | Conditions | min. | typ. | max. | Units |
| IGBT | | | | | |
| $V_{GE(th)}$ | $V_{GE} = V_{CE}, I_C = 12\text{mA}$ | 5 | 5,8 | 6,5 | V |
| I_{CES} | $V_{GE} = 0\text{V}, V_{CE} = V_{CES}$ | | 0,15 | 0,45 | mA |
| V_{CE0} | | $T_j = 25^\circ\text{C}$ | 1 | 1,2 | V |
| | | $T_j = 125^\circ\text{C}$ | 0,9 | | V |
| r_{CE} | $V_{GE} = 15\text{V}$ | $T_j = 25^\circ\text{C}$ | 2,3 | 3,2 | m Ω |
| | | $T_j = 125^\circ\text{C}$ | 3,7 | | m Ω |
| $V_{CE(sat)}$ | $I_{Cnom} = 300\text{A}, V_{GE} = 15\text{V}$ | $T_j = 25^\circ\text{C}_{chiplev.}$ | 1,7 | 2,15 | V |
| | | $T_j = 125^\circ\text{C}_{chiplev.}$ | 2 | | V |
| C_{ies} | $V_{CE} = 25, V_{GE} = 0\text{V}$ | $f = 1\text{MHz}$ | 23,1 | | nF |
| C_{oes} | | | 1,9 | | nF |
| C_{res} | | | 1,2 | | nF |
| Q_G | $V_{GE} = -8\text{V} \dots +20\text{V}$ | 2800 | | nC | |
| R_{Gint} | $T_j = ^\circ\text{C}$ | 2,5 | | Ω | |
| $t_{d(on)}$ | $R_{Gon} = 2\Omega$ | $V_{CC} = 600\text{V}$ $I_{Cnom} = 300\text{A}$ | 330 | | ns |
| | | | $T_j = 125^\circ\text{C}$ | 50 | ns |
| E_{on} | $R_{Goff} = 2\Omega$ | $V_{GE} = \pm 15\text{V}$ | 29 | | mJ |
| $t_{d(off)}$ | | | 650 | | ns |
| t_f | | | 110 | | ns |
| E_{off} | | | 48 | | mJ |
| $R_{th(j-c)}$ | per IGBT | | | 0,08 | K/W |



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- High short circuit capability, self limiting to $6 \times I_c$

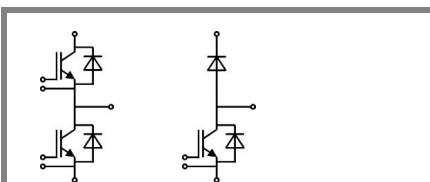
Typical Applications

- AC inverter drives
- UPS
- Electronic welders

| Characteristics | | | | | |
|---------------------------|--|---|------|-------|-------|
| Symbol | Conditions | min. | typ. | max. | Units |
| Inverse Diode | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom} = 300 \text{ A}; V_{GE} = 0 \text{ V}$ | $T_j = 25 \text{ }^\circ\text{C}_{chiplev.}$ | 1,6 | 1,8 | V |
| | | $T_j = 125 \text{ }^\circ\text{C}_{chiplev.}$ | 1,6 | 1,8 | V |
| V_{F0} | | $T_j = 25 \text{ }^\circ\text{C}$ | 1 | 1,1 | V |
| | | $T_j = 125 \text{ }^\circ\text{C}$ | 0,8 | 0,9 | V |
| r_F | | $T_j = 25 \text{ }^\circ\text{C}$ | 2 | 2,3 | mΩ |
| | | $T_j = 125 \text{ }^\circ\text{C}$ | 2,7 | 3 | mΩ |
| I_{RRM} | $I_{Fnom} = 300 \text{ A}$ | $T_j = 125 \text{ }^\circ\text{C}$ | 390 | | A |
| Q_{rr} | $di/dt = 6300 \text{ A}/\mu\text{s}$ | | 77 | | μC |
| E_{rr} | $V_{GE} = -15 \text{ V}; V_{CC} = 600 \text{ V}$ | | 27 | | mJ |
| $R_{th(j-c)D}$ | per diode | | | 0,18 | K/W |
| Freewheeling Diode | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom} = 300 \text{ A}; V_{GE} = 0 \text{ V}$ | $T_j = 25 \text{ }^\circ\text{C}_{chiplev.}$ | 1,6 | 1,8 | V |
| | | $T_j = 125 \text{ }^\circ\text{C}_{chiplev.}$ | 1,6 | 1,8 | V |
| V_{F0} | | $T_j = 25 \text{ }^\circ\text{C}$ | 1 | 1,1 | V |
| | | $T_j = 125 \text{ }^\circ\text{C}$ | 0,8 | 0,9 | V |
| r_F | | $T_j = 25 \text{ }^\circ\text{C}$ | 2 | 2,3 | V |
| | | $T_j = 125 \text{ }^\circ\text{C}$ | 2,7 | 3 | V |
| I_{RRM} | $I_{Fnom} = 300 \text{ A}$ | $T_j = 125 \text{ }^\circ\text{C}$ | 390 | | A |
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| E_{rr} | $V_{GE} = -15 \text{ V}; V_{CC} = 600 \text{ V}$ | | 27 | | mJ |
| $R_{th(j-c)D}$ | per diode | | | 0,18 | K/W |
| Module | | | | | |
| L_{CE} | | | 15 | 20 | nH |
| $R_{CC'+EE'}$ | res., terminal-chip | $T_{case} = 25 \text{ }^\circ\text{C}$ | 0,35 | | mΩ |
| | | $T_{case} = 125 \text{ }^\circ\text{C}$ | 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 |

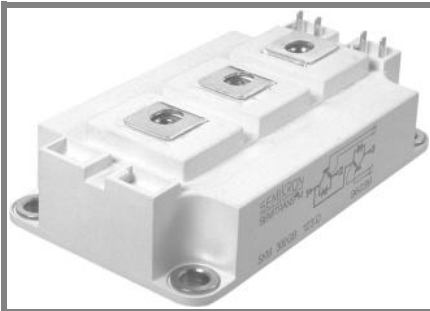
This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX.

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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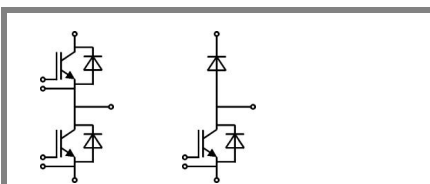
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Typical Applications

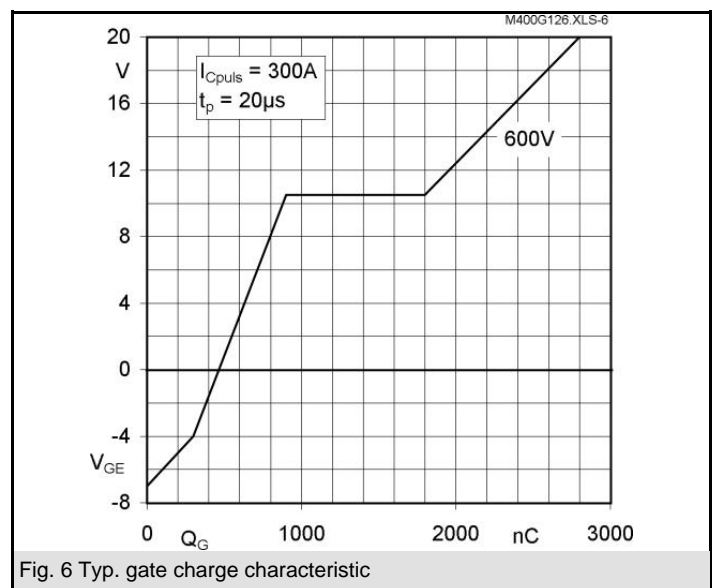
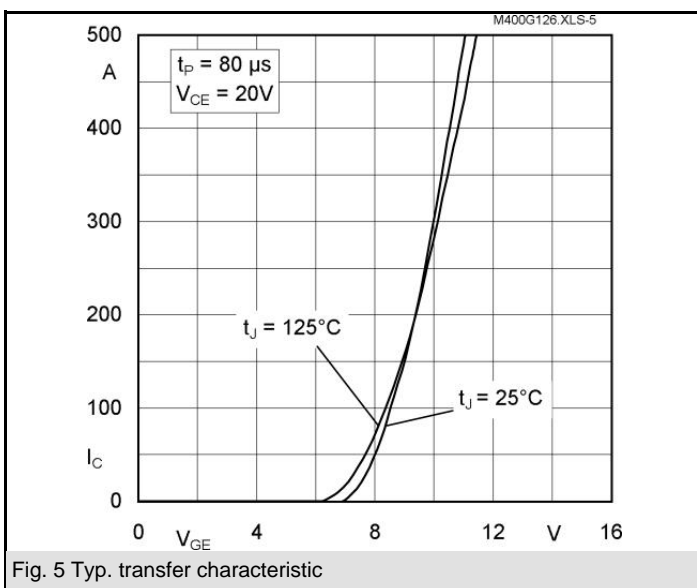
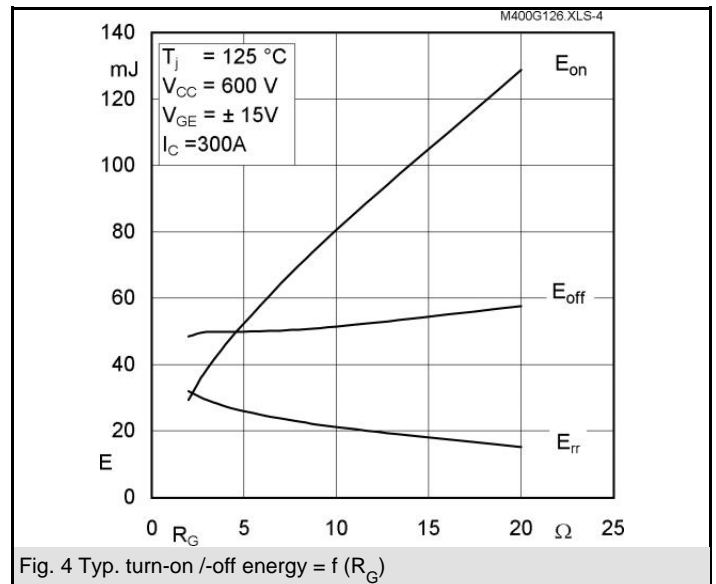
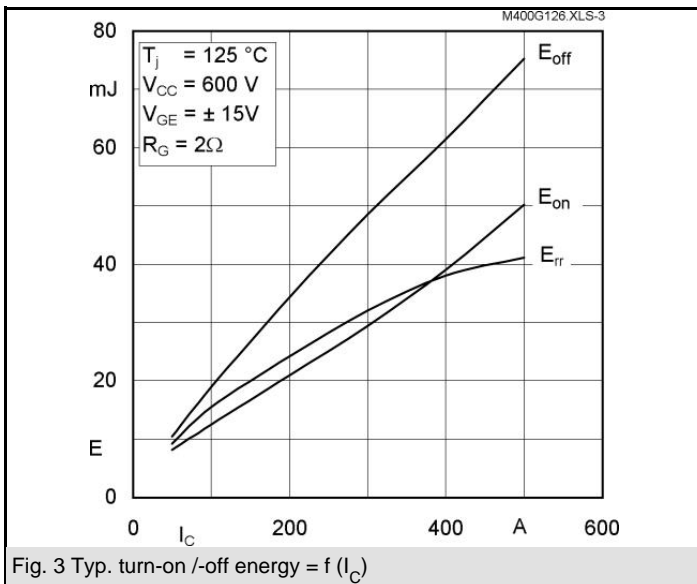
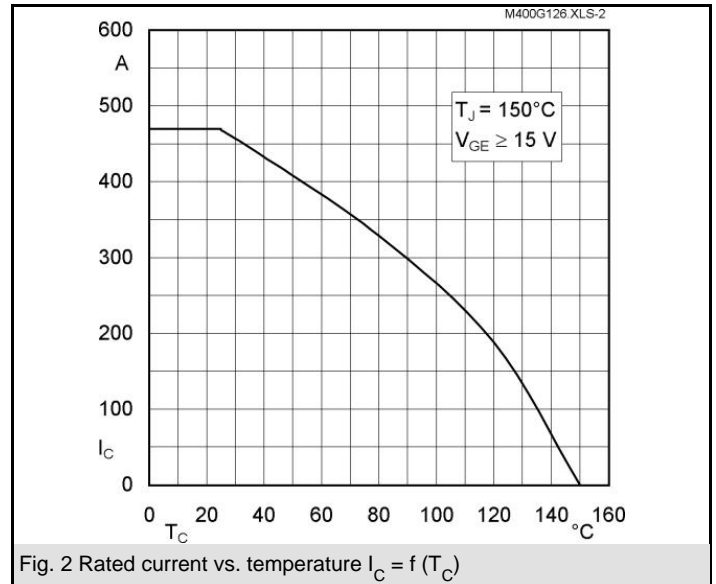
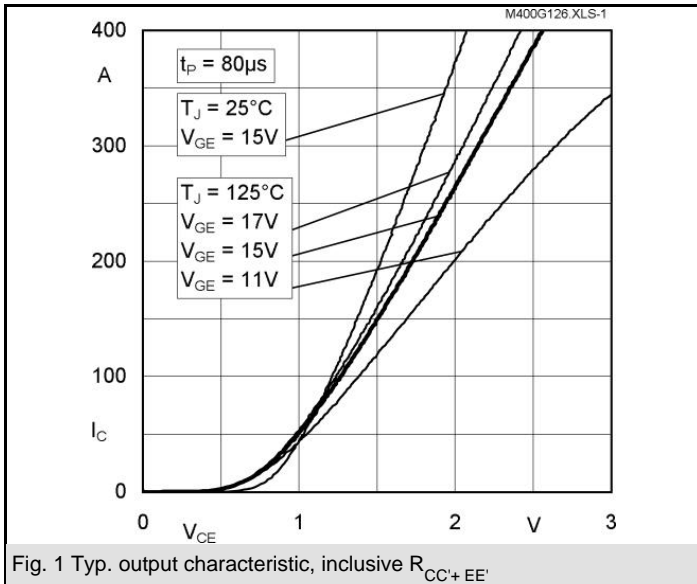
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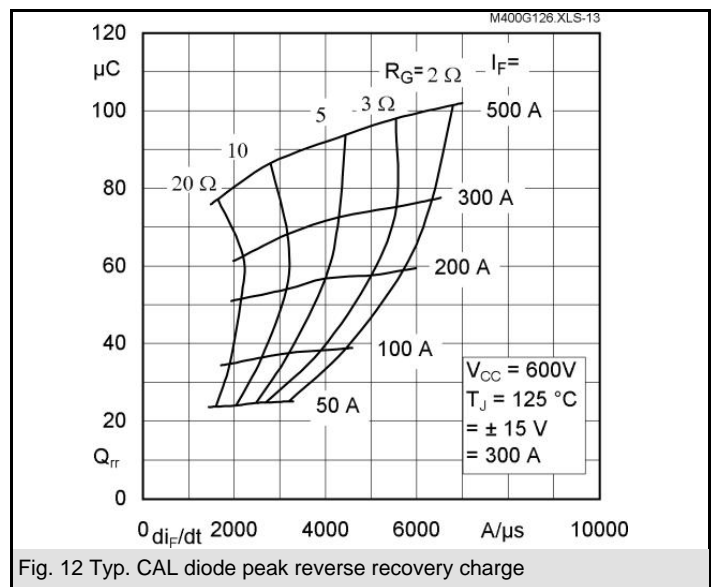
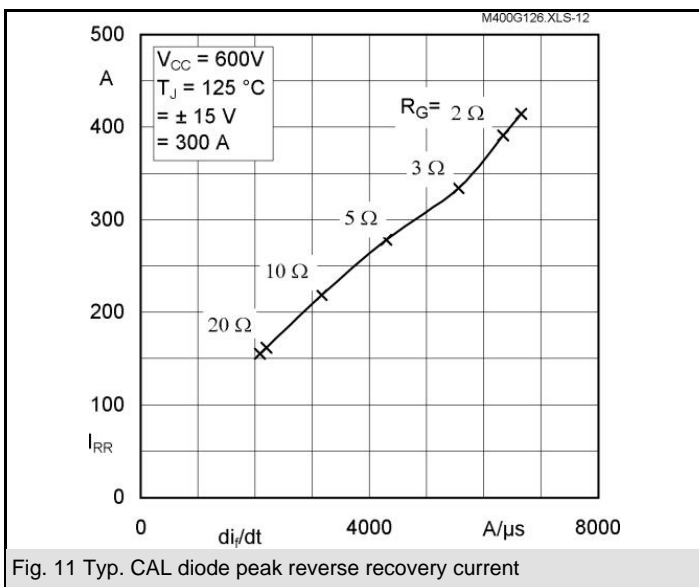
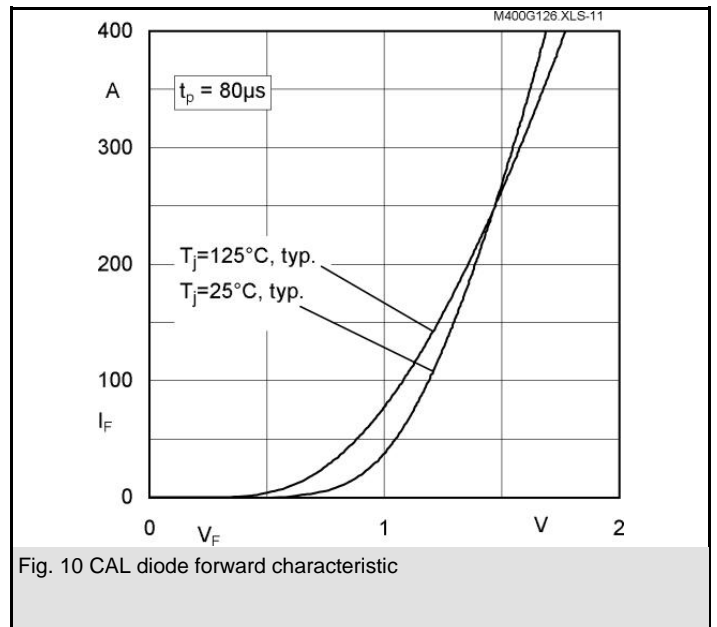
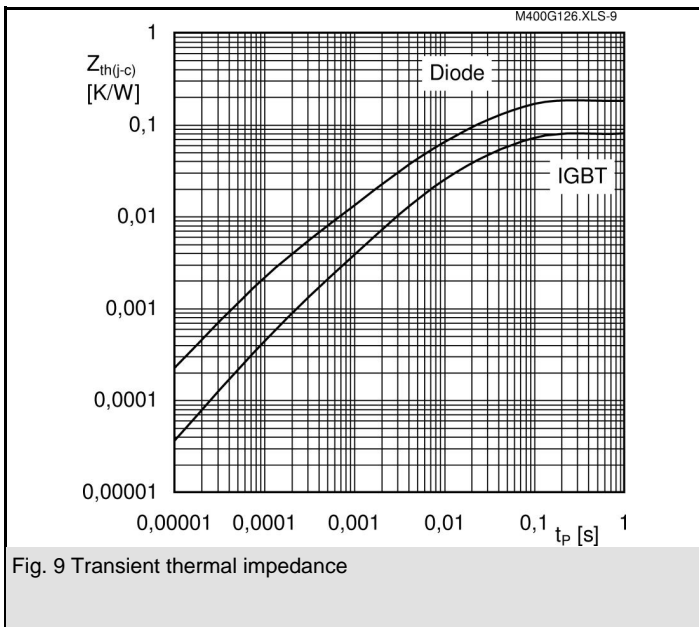
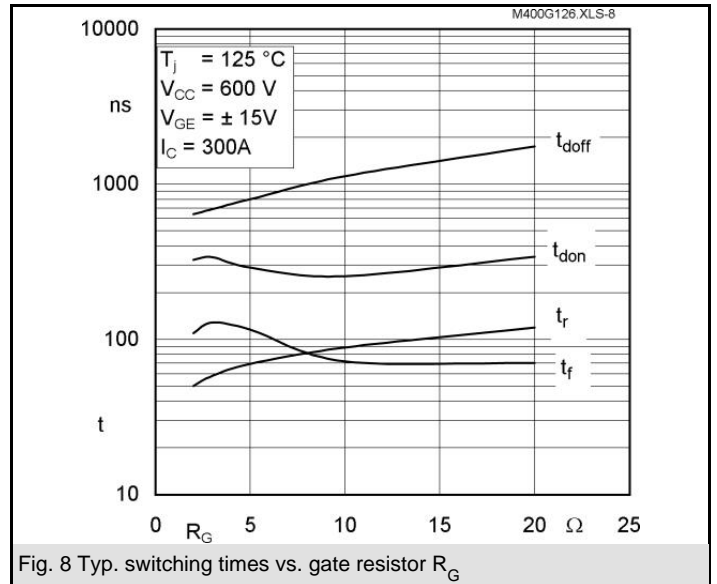
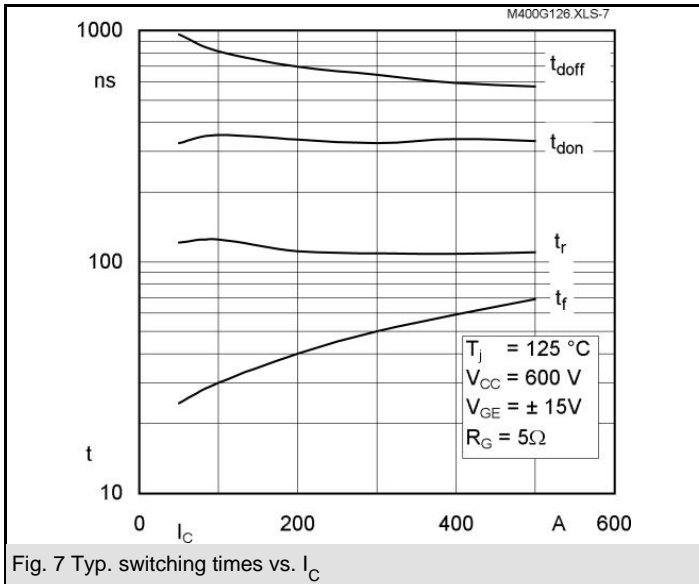
| Z_{th} | | Conditions | Values | Units |
|----------------------------------|--|------------|--------|-------|
| $Z_{th(j-c)I}$ | | | | |
| $R_{\theta j-c}$ | | $i = 1$ | 55 | mk/W |
| $R_{\theta j-c}$ | | $i = 2$ | 21 | mk/W |
| $R_{\theta j-c}$ | | $i = 3$ | 3,6 | mk/W |
| $R_{\theta j-c}$ | | $i = 4$ | 0,4 | mk/W |
| $\tau_{\theta j-c}$ | | $i = 1$ | 0,0393 | s |
| $\tau_{\theta j-c}$ | | $i = 2$ | 0,0171 | s |
| $\tau_{\theta j-c}$ | | $i = 3$ | 0,002 | s |
| $\tau_{\theta j-c}$ | | $i = 4$ | 0,0002 | s |
| $Z_{th(j-c)D}$ | | | | |
| $R_{\theta j-c}$ | | $i = 1$ | 120 | mk/W |
| $R_{\theta j-c}$ | | $i = 2$ | 48 | mk/W |
| $R_{\theta j-c}$ | | $i = 3$ | 10 | mk/W |
| $R_{\theta j-c}$ | | $i = 4$ | 2 | mk/W |
| $\tau_{\theta j-c}$ | | $i = 1$ | 0,0262 | s |
| $\tau_{\theta j-c}$ | | $i = 2$ | 0,0417 | s |
| $\tau_{\theta j-c}$ | | $i = 3$ | 0,0012 | s |
| $\tau_{\theta j-c}$ | | $i = 4$ | 0,001 | s |



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Case D 56



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Case D 56



GAL

Case D 57 (→ D 56)