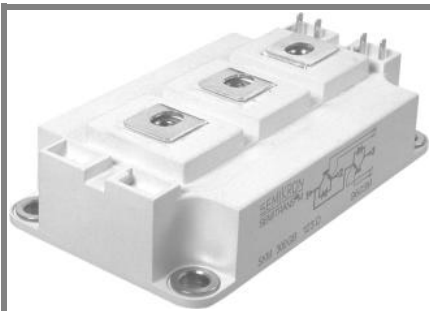


SKM 400GB125D



SEMITRANS® 3

Ultra Fast IGBT Modules

SKM 400GB125D

SKM 400GAL125D

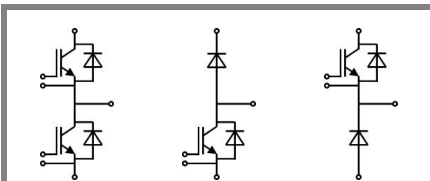
SKM 400GAR125D

Features

- Low inductance case
- Short tail current with low temperature dependence
- High short circuit capability, self limiting to $6 \times I_{Cnom}$
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DBC Direct Copper Bonding Technology
- Large clearance (13 mm) and creepage distances (20 mm)

Typical Applications

- Switched mode power supplies at $f_{sw} > 20\text{kHz}$
- Resonant inverters up to 100 kHz
- Inductive heating
- Electronic welders at $f_{sw} > 20\text{kHz}$



GB

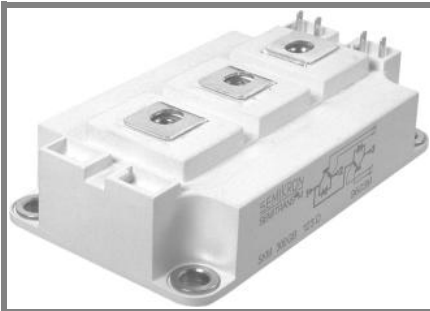
GAL

GAR

| 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 | $T_j = 150^\circ\text{C}$ | $T_{case} = 25^\circ\text{C}$ | 400 | A |
| | | $T_{case} = 80^\circ\text{C}$ | 300 | 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 | $T_j = 150^\circ\text{C}$ | $T_{case} = 25^\circ\text{C}$ | 390 | A |
| | | $T_{case} = 80^\circ\text{C}$ | 260 | A |
| I_{FRM} | $I_{FRM} = 2 \times I_{Fnom}$ | 600 | | A |
| I_{FSM} | $t_p = 10\text{ms}; \text{sin.}$ | $T_j = 150^\circ\text{C}$ | 2880 | |
| Freewheeling Diode | | | | |
| I_F | $T_j = 150^\circ\text{C}$ | $T_{case} = 25^\circ\text{C}$ | 390 | A |
| | | $T_{case} = 80^\circ\text{C}$ | 260 | A |
| I_{FRM} | $I_{FRM} = 2 \times I_{Fnom}$ | 600 | | A |
| I_{FSM} | $t_p = 10\text{ms}; \text{sin.}$ | $T_j = 150^\circ\text{C}$ | 2880 | |
| 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 | | | | | |
| $V_{GE(th)}$ | $V_{GE} = V_{CE}, I_C = 12\text{mA}$ | 4,5 | 5,5 | 6,5 | V |
| I_{CES} | $V_{GE} = 0\text{V}, V_{CE} = V_{CES}$ | | 0,15 | 0,45 | mA |
| V_{CE0} | | $T_j = 25^\circ\text{C}$ | 1,4 | | V |
| | | $T_j = 125^\circ\text{C}$ | 1,7 | | V |
| r_{CE} | $V_{GE} = 15\text{V}$ | $T_j = 25^\circ\text{C}$ | 6,3 | | $\text{m}\Omega$ |
| | | $T_j = 125^\circ\text{C}$ | 7,6 | | $\text{m}\Omega$ |
| $V_{CE(sat)}$ | $I_{Cnom} = 300\text{A}, V_{GE} = 15\text{V}$ | $T_j = 25^\circ\text{C}_{chiplev.}$ | 3,3 | 3,85 | V |
| | | $T_j = 125^\circ\text{C}_{chiplev.}$ | 4 | 4,55 | V |
| C_{ies} | $V_{CE} = 25, V_{GE} = 0\text{V}$ | $f = 1\text{MHz}$ | 22 | | nF |
| C_{oes} | | | 3,3 | | nF |
| C_{res} | | | 1,2 | | nF |
| Q_G | $V_{GE} = 0\text{V} - +20\text{V}$ | 2650 | | nC | |
| R_{Gint} | $T_j = ^\circ\text{C}$ | 1,25 | | Ω | |
| $t_{d(on)}$ | $R_{Gon} = 2\Omega$ | $V_{CC} = 600\text{V}$ $I_{Cnom} = 300\text{A}$ | 70 | | ns |
| | | | $T_j = 125^\circ\text{C}$ | 50 | |
| E_{on} | $R_{Goff} = 2\Omega$ | $V_{GE} = \pm 15\text{V}$ | 17 | | mJ |
| $t_{d(off)}$ | | | 500 | | ns |
| t_f | | | 32 | | ns |
| E_{off} | | | 18 | | mJ |
| $R_{th(j-c)}$ | per IGBT | | | 0,05 | K/W |

SKM 400GB125D



SEMITRANS® 3

Ultra Fast IGBT Modules

SKM 400GB125D

SKM 400GAL125D

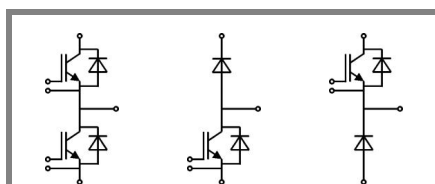
SKM 400GAR125D

Features

- Low inductance case
- Short tail current with low temperature dependence
- High short circuit capability, self limiting to $6 \times I_{cnom}$
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DBC Direct Copper Bonding Technology
- Large clearance (13 mm) and creepage distances (20 mm)

Typical Applications

- Switched mode power supplies at $f_{sw} > 20\text{kHz}$
- Resonant inverters up to 100 kHz
- Inductive heating
- Electronic welders at $f_{sw} > 20\text{ kHz}$



GB

GAL

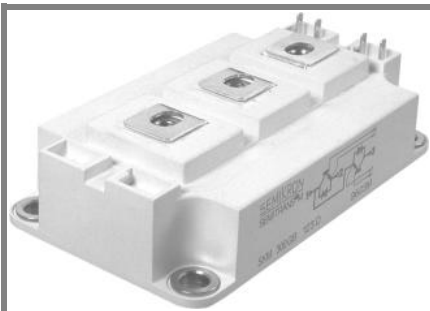
GAR

| Characteristics | | | | | |
|---------------------------|--|--|------|-------|-------|
| Symbol | Conditions | min. | typ. | max. | Units |
| Inverse Diode | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom} = 300\text{ A}; V_{GE} = 0\text{ V}$ | $T_j = 25\text{ }^\circ\text{C}_{chiplev.}$ | 2 | 2,5 | V |
| | | $T_j = 125\text{ }^\circ\text{C}_{chiplev.}$ | 1,8 | | V |
| V_{F0} | | $T_j = 25\text{ }^\circ\text{C}$ | 1,1 | 1,2 | V |
| | | $T_j = 125\text{ }^\circ\text{C}$ | | | V |
| r_F | | $T_j = 25\text{ }^\circ\text{C}$ | 3 | 4,3 | mΩ |
| | | $T_j = 125\text{ }^\circ\text{C}$ | | | mΩ |
| I_{RRM} | $I_{Fnom} = 300\text{ A}$ | $T_j = 125\text{ }^\circ\text{C}$ | 350 | | A |
| Q_{rr} | $di/dt = 8300\text{ A}/\mu\text{s}$ | | 45 | | μC |
| E_{rr} | $V_{GE} = 0\text{ V}; V_{CC} = 600\text{ V}$ | | 16 | | mJ |
| $R_{th(j-c)D}$ | per diode | | | 0,125 | K/W |
| Freewheeling Diode | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom} = 300\text{ A}; V_{GE} = 0\text{ V}$ | $T_j = 25\text{ }^\circ\text{C}_{chiplev.}$ | 2 | 2,5 | V |
| | | $T_j = 125\text{ }^\circ\text{C}_{chiplev.}$ | 1,8 | | V |
| V_{F0} | | $T_j = 25\text{ }^\circ\text{C}$ | 1,1 | 1,2 | V |
| | | $T_j = 125\text{ }^\circ\text{C}$ | | | V |
| r_F | | $T_j = 25\text{ }^\circ\text{C}$ | 3 | 4,3 | V |
| | | $T_j = 125\text{ }^\circ\text{C}$ | | | V |
| I_{RRM} | $I_{Fnom} = 300\text{ A}$ | $T_j = 125\text{ }^\circ\text{C}$ | 350 | | A |
| Q_{rr} | $di/dt = 8300\text{ A}/\mu\text{s}$ | | 45 | | μC |
| E_{rr} | $V_{GE} = 0\text{ V}; V_{CC} = 600\text{ V}$ | | 16 | | mJ |
| $R_{th(j-c)FD}$ | per diode | | | 0,125 | K/W |
| Module | | | | | |
| L_{CE} | | | 15 | 20 | nH |
| $R_{CC'+EE'}$ | res., terminal-chip | $T_{case} = 25\text{ }^\circ\text{C}$ | 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.

SKM 400GB125D



SEMITRANS® 3

Ultra Fast IGBT Modules

SKM 400GB125D

SKM 400GAL125D

SKM 400GAR125D

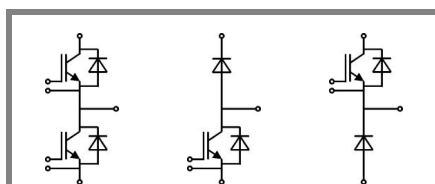
Features

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Typical Applications

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- Resonant inverters up to 100 kHz
- Inductive heating
- Electronic welders at $f_{sw} > 20\text{ kHz}$

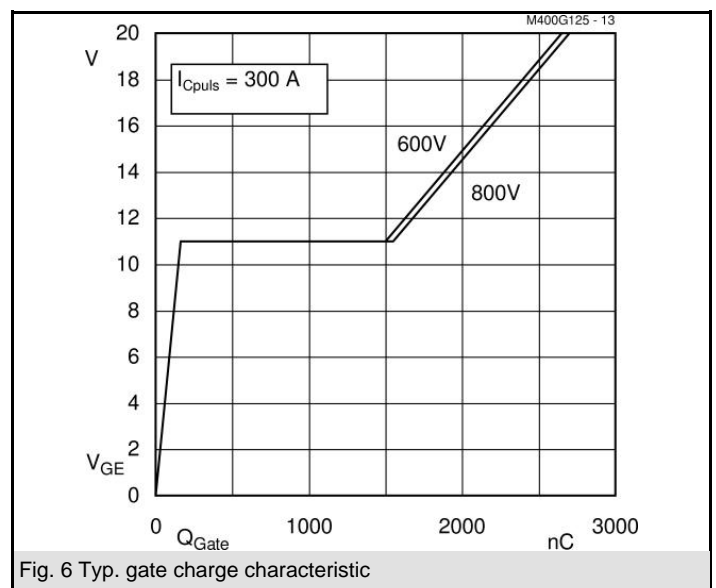
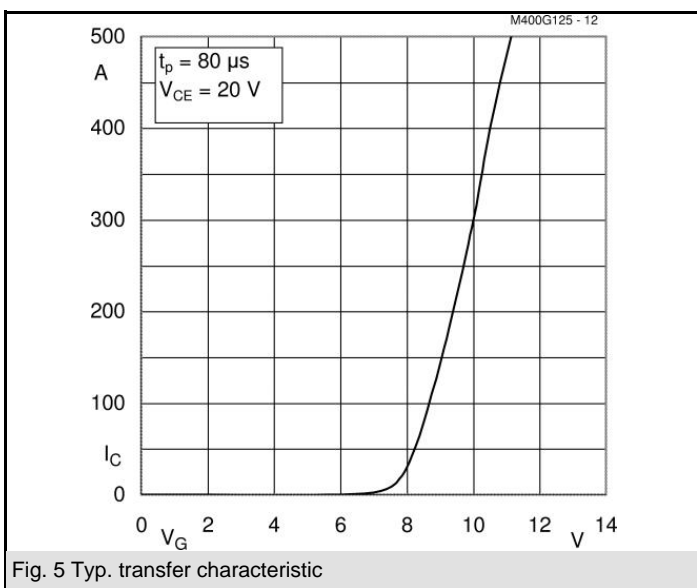
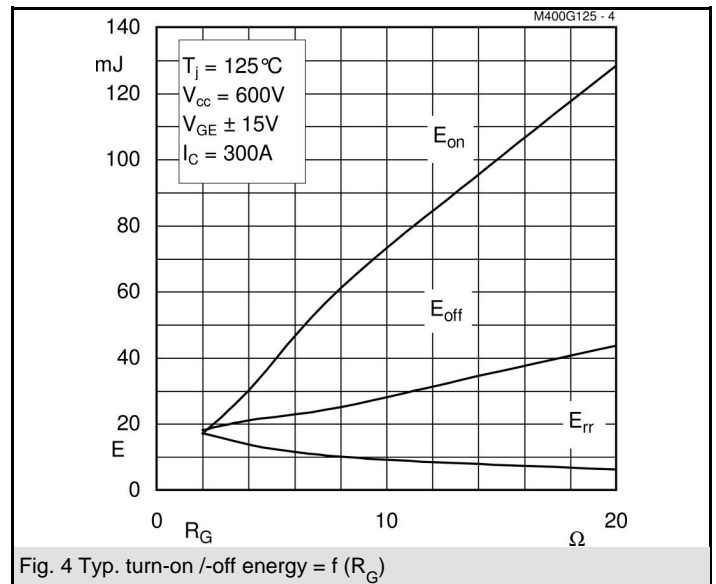
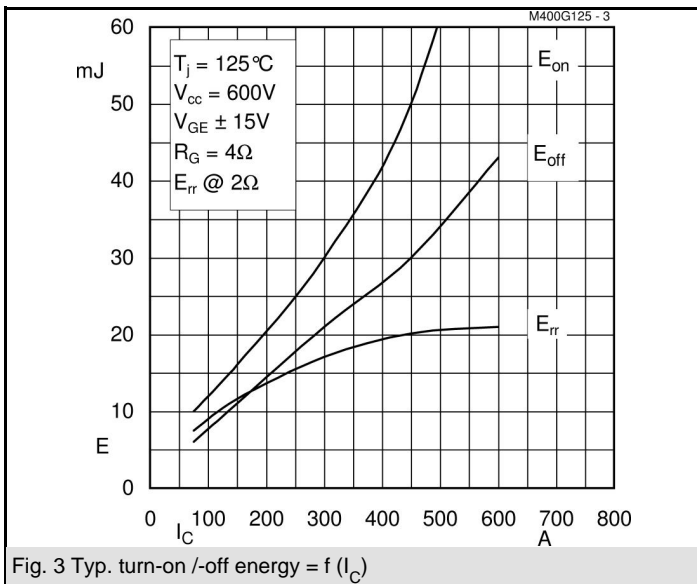
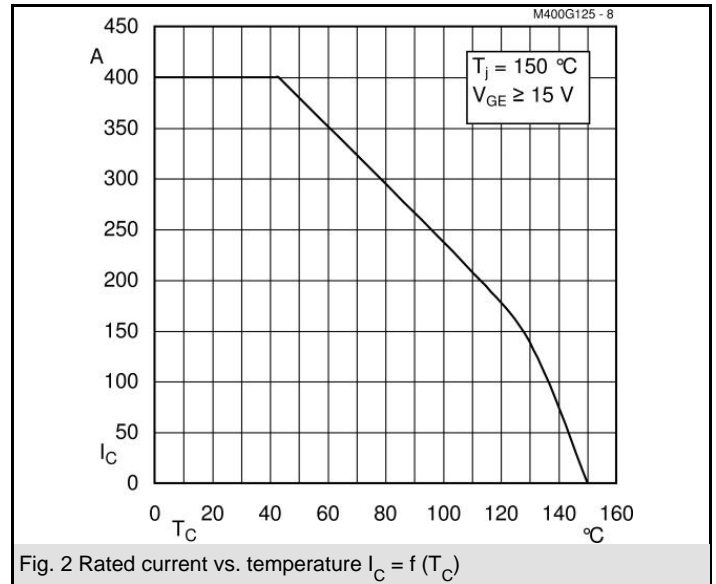
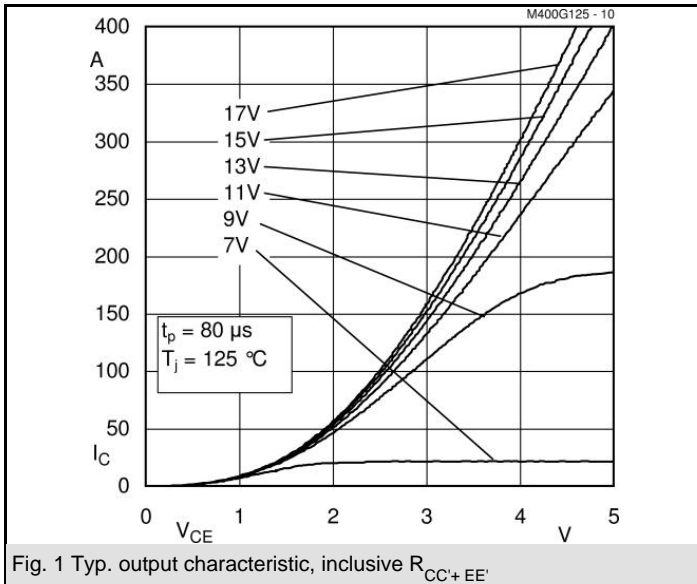
| Z_{th} | | Conditions | Values | Units |
|----------------------------------|--|------------|--------|-------|
| $Z_{th(j-c)I}$ | | | | |
| $R_{\theta j-c}$ | | $i = 1$ | 36 | mk/W |
| $R_{\theta j-c}$ | | $i = 2$ | 10,5 | mk/W |
| $R_{\theta j-c}$ | | $i = 3$ | 3 | mk/W |
| $R_{\theta j-c}$ | | $i = 4$ | 0,5 | mk/W |
| $\tau_{th(j-c)}$ | | $i = 1$ | 0,0744 | s |
| $\tau_{th(j-c)}$ | | $i = 2$ | 0,0078 | s |
| $\tau_{th(j-c)}$ | | $i = 3$ | 0,0016 | s |
| $\tau_{th(j-c)}$ | | $i = 4$ | 0,0002 | s |
| $Z_{th(j-c)D}$ | | | | |
| $R_{\theta j-c}$ | | $i = 1$ | 75 | mk/W |
| $R_{\theta j-c}$ | | $i = 2$ | 38 | mk/W |
| $R_{\theta j-c}$ | | $i = 3$ | 10,6 | mk/W |
| $R_{\theta j-c}$ | | $i = 4$ | 1,4 | mk/W |
| $\tau_{th(j-c)}$ | | $i = 1$ | 0,0386 | s |
| $\tau_{th(j-c)}$ | | $i = 2$ | 0,0201 | s |
| $\tau_{th(j-c)}$ | | $i = 3$ | 0,001 | s |
| $\tau_{th(j-c)}$ | | $i = 4$ | 0,003 | s |

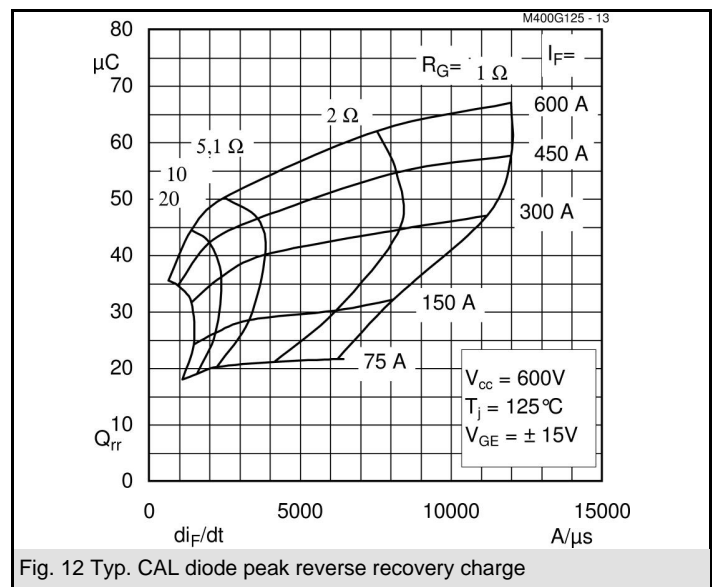
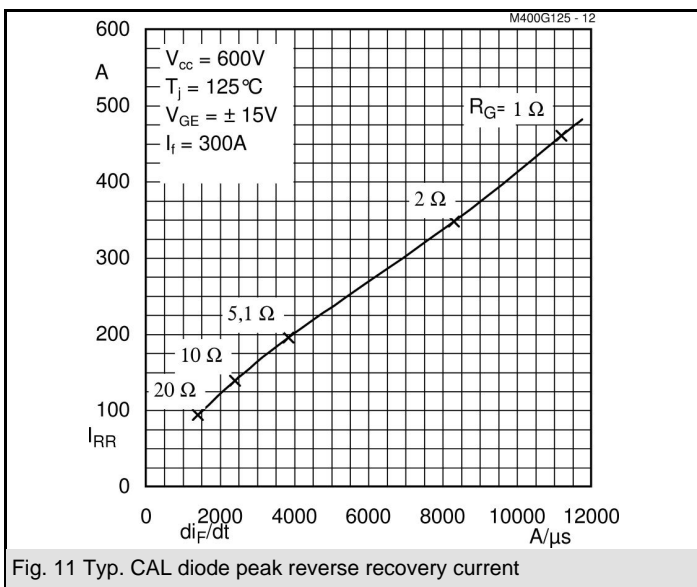
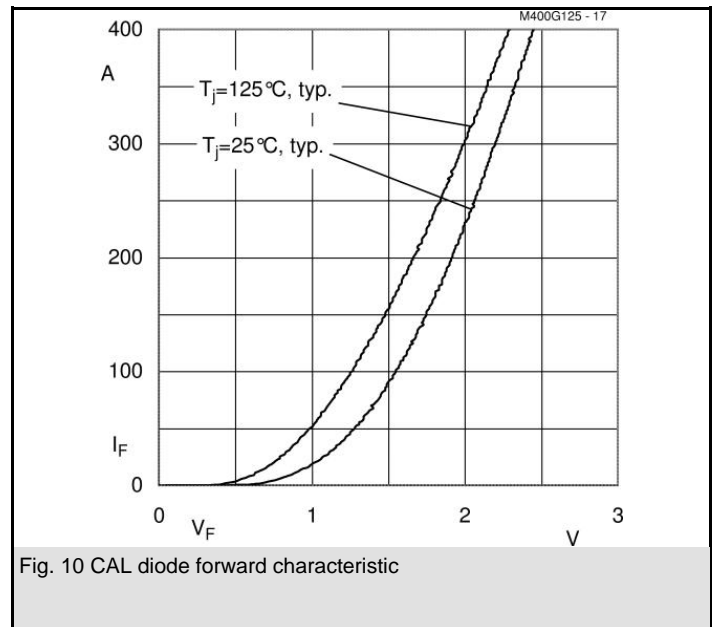
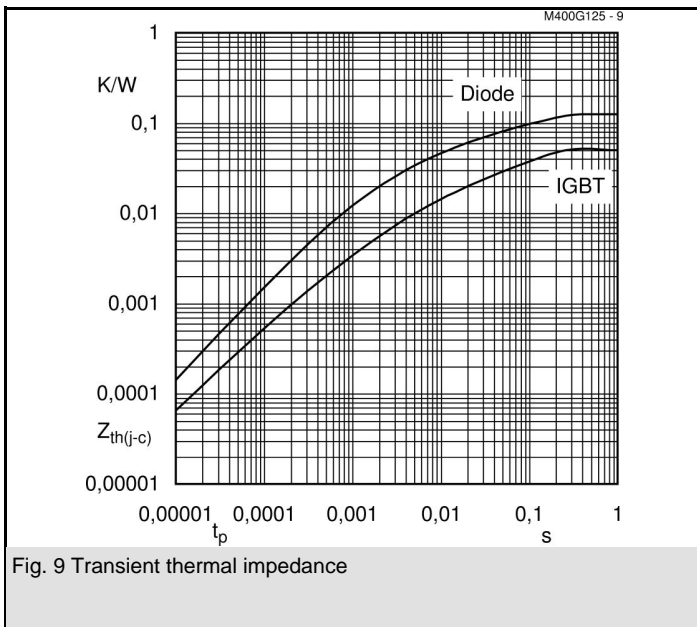
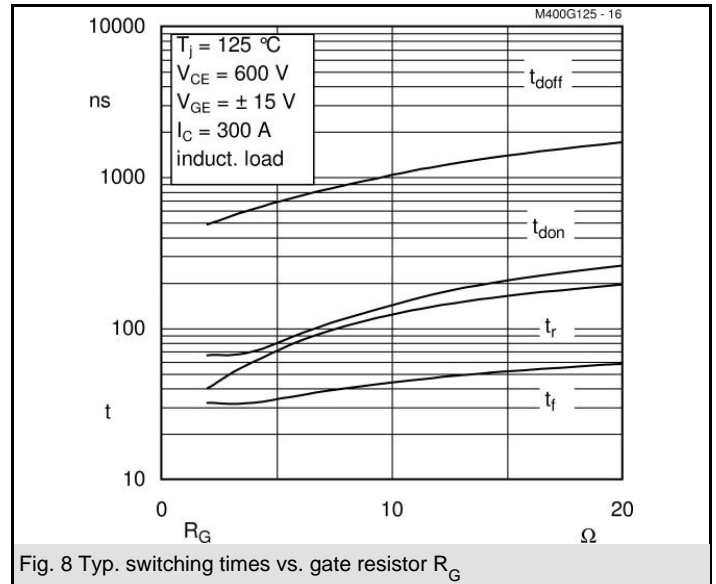
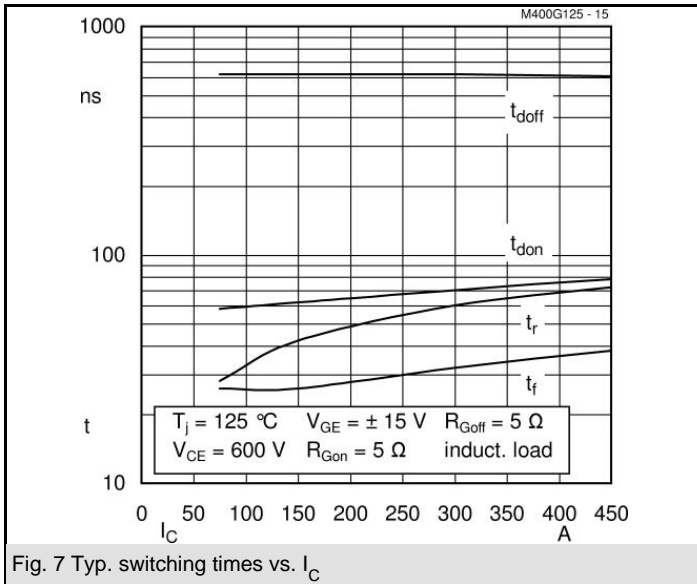


GB

GAL

GAR



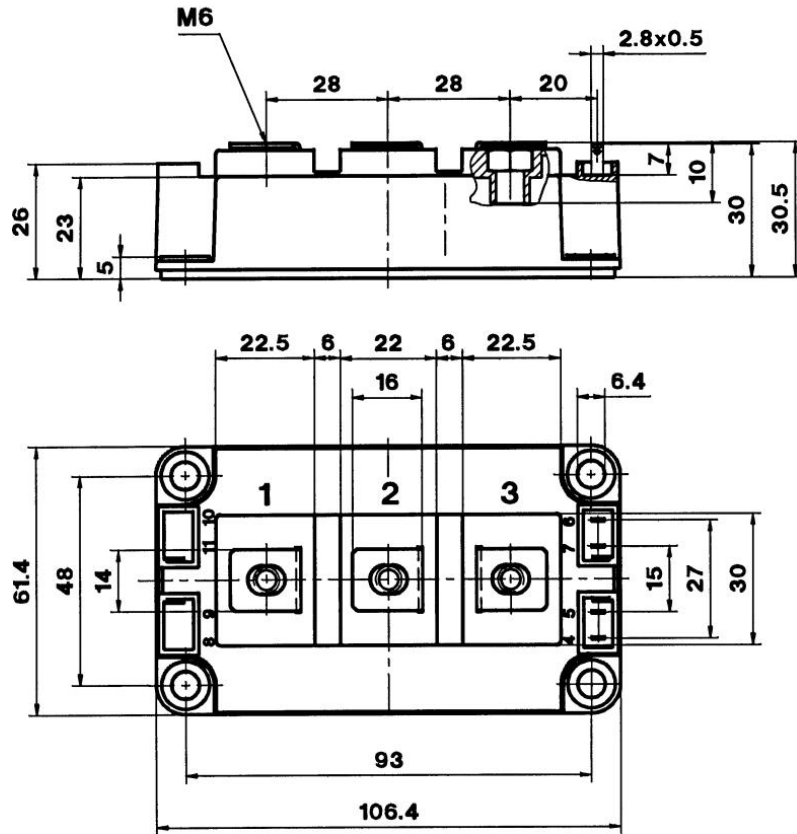


SKM 400GB125D

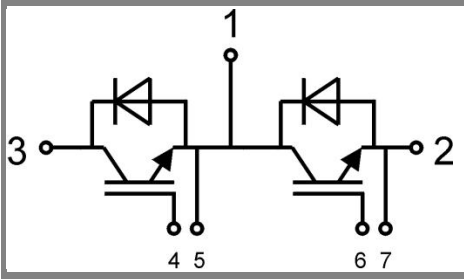
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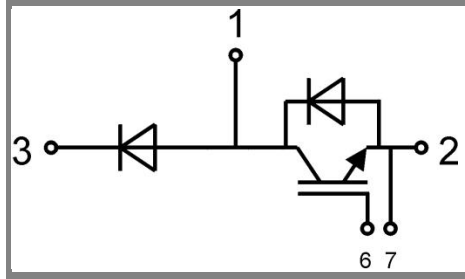


Case D 56



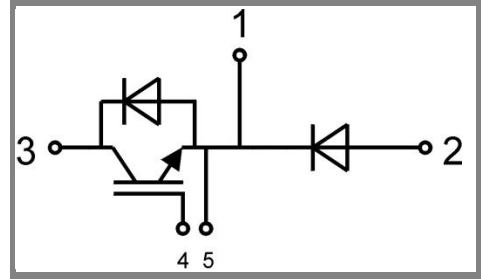
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Case D 56



GAL

Case D 57 (→ D 56)



GAR

Case D 58 (→ D 56)