

SKM 40GD123D



SEMITRANS® 6

Standard IGBT modules

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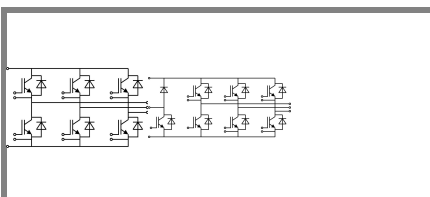
SKM 40GDL123D

Features

- MOS input (voltage controlled)
- N channel, homogeneous Si
- Low inductance case
- Very low tail current with low temperature dependence
- High short circuit capability, self limiting to $6 \times I_{Cnom}$
- Latch-up free
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DCB Direct Copper Bonding Technology
- Large clearance (9 mm) and creepage distances (13 mm)

Typical Applications

- Switched mode power supplies
- Three phase inverters for AC motor speed control
- Pulse frequencies also above 15 kHz



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| 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 | $T_j = 150^\circ\text{C}$ | $T_{case} = 25^\circ\text{C}$ | 40 | A |
| | | $T_{case} = 80^\circ\text{C}$ | 30 | A |
| I_{CRM} | $I_{CRM} = 2 \times I_{Cnom}$ | 50 | | 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 | $T_j = 150^\circ\text{C}$ | $T_{case} = 25^\circ\text{C}$ | 45 | A |
| | | $T_{case} = 80^\circ\text{C}$ | 30 | A |
| I_{FRM} | $I_{FRM} = 2 \times I_{Fnom}$ | 50 | | A |
| I_{FSM} | $t_p = 10\text{ ms}; \sin.$ | $T_j = 150^\circ\text{C}$ | 350 | |
| Module | | | | |
| $I_{t(RMS)}$ | | 100 | | A |
| T_{vj} | | - 40 ... + 150 | | $^\circ\text{C}$ |
| T_{stg} | | - 40...+ 125 | | $^\circ\text{C}$ |
| V_{isol} | AC, 1 min. | 2500 | | V |

| Characteristics | | $T_c = 25^\circ\text{C}$, unless otherwise specified | | | |
|-----------------|--|---|------|------|------------------|
| Symbol | Conditions | min. | typ. | max. | Units |
| IGBT | | | | | |
| $V_{GE(th)}$ | $V_{GE} = V_{CE}, I_C = 1\text{ mA}$ | 4,5 | 5,5 | 6,5 | V |
| I_{CES} | $V_{GE} = 0\text{ V}, V_{CE} = V_{CES}$ | | 0,3 | 0,9 | mA |
| V_{CE0} | | $T_j = 25^\circ\text{C}$ | 1,4 | 1,6 | V |
| | | $T_j = 125^\circ\text{C}$ | 1,6 | 1,8 | V |
| r_{CE} | $V_{GE} = 15\text{ V}$ | $T_j = 25^\circ\text{C}$ | 44 | 56 | $\text{m}\Omega$ |
| | | $T_j = 125^\circ\text{C}$ | 60 | 76 | $\text{m}\Omega$ |
| $V_{CE(sat)}$ | $I_{Cnom} = 25\text{ A}, V_{GE} = 15\text{ V}$ | $T_j = ^\circ\text{C}_{chiplev.}$ | 2,5 | 3 | V |
| C_{ies} | $V_{CE} = 25, V_{GE} = 0\text{ V}$ | $f = 1\text{ MHz}$ | 1,6 | 2,1 | nF |
| C_{oes} | | | 0,25 | 0,3 | nF |
| C_{res} | | | 0,11 | 0,15 | nF |
| $t_{d(on)}$ | $R_{Gon} = 40\ \Omega$ | $V_{CC} = 600\text{V}$ $I_{Cnom} = 25\text{A}$ | 70 | | ns |
| t_r | | | 55 | | ns |
| E_{on} | $R_{Goff} = 40\ \Omega$ | $T_j = 125^\circ\text{C}$ $V_{GE} = -15\text{V}$ | 3,8 | | mJ |
| $t_{d(off)}$ | | | 400 | | ns |
| t_f | | | 40 | | ns |
| E_{off} | | | 2,3 | | mJ |
| $R_{th(j-c)}$ | per IGBT | | | 0,56 | K/W |

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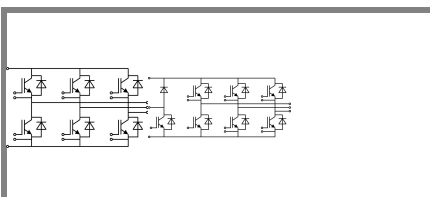
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| Characteristics | | | | | |
|---------------------------|---|---|------|------|-------|
| Symbol | Conditions | min. | typ. | max. | Units |
| Inverse Diode | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom} = 25 \text{ A}; V_{GE} = 0 \text{ V}$ | $T_j = 25 \text{ }^\circ\text{C}_{chiplev.}$ | 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 | | $T_j = 25 \text{ }^\circ\text{C}$ | 36 | 52 | mΩ |
| | | $T_j = 125 \text{ }^\circ\text{C}$ | | | mΩ |
| I_{RRM} | $I_{Fnom} = 25 \text{ A}$ | $T_j = 125 \text{ }^\circ\text{C}$ | 25 | | A |
| Q_{rr} | $di/dt = 500 \text{ A}/\mu\text{s}$ | | 4,5 | | μC |
| E_{rr} | $V_{GE} = 0 \text{ V}; V_{CC} = 600 \text{ V}$ | | 1,35 | | mJ |
| $R_{th(j-c)D}$ | per diode | | | 1 | K/W |
| Freewheeling Diode | | | | | |
| $V_F = V_{EC}$ | $I_{Fnom} = \text{A}; V_{GE} = \text{V}$ | $T_j = \text{ }^\circ\text{C}_{chiplev.}$ | | | V |
| V_{F0} | | $T_j = 25 \text{ }^\circ\text{C}$ | | | V |
| | | $T_j = 125 \text{ }^\circ\text{C}$ | | | V |
| r_F | | $T_j = 25 \text{ }^\circ\text{C}$ | | | V |
| | | $T_j = 125 \text{ }^\circ\text{C}$ | | | V |
| I_{RRM} | $I_{Fnom} = \text{A}$ | $T_j = \text{ }^\circ\text{C}$ | | | A |
| Q_{rr} | | | | | μC |
| E_{rr} | $V_{GE} = 0 \text{ V}; V_{CC} = 600 \text{ V}$ | | | | mJ |
| | per diode | | | | K/W |
| Module | | | | | |
| L_{CE} | | | | 60 | nH |
| $R_{th(c-s)}$ | per module | | | 0,05 | K/W |
| M_s | to heat sink M5 | 4 | | 5 | Nm |
| w | | | | 175 | 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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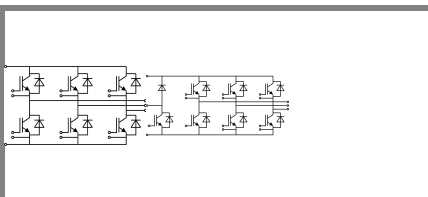
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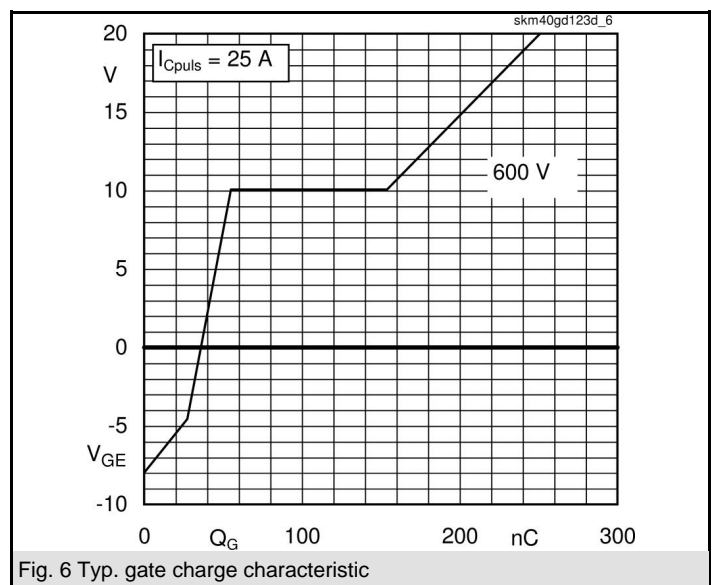
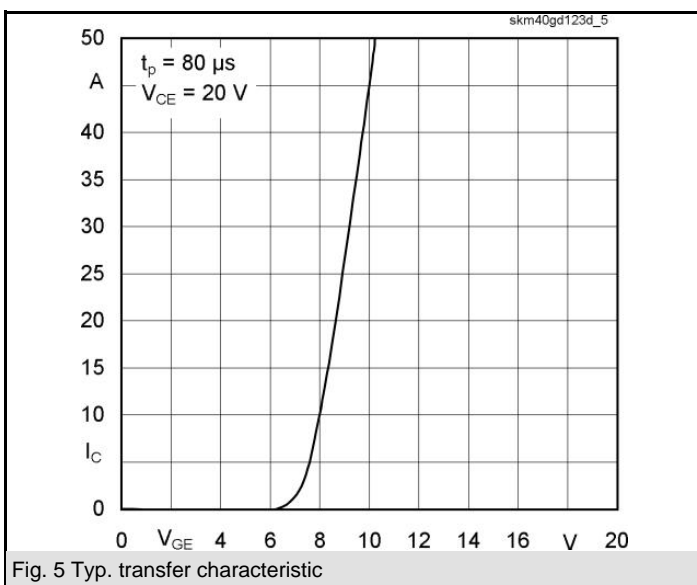
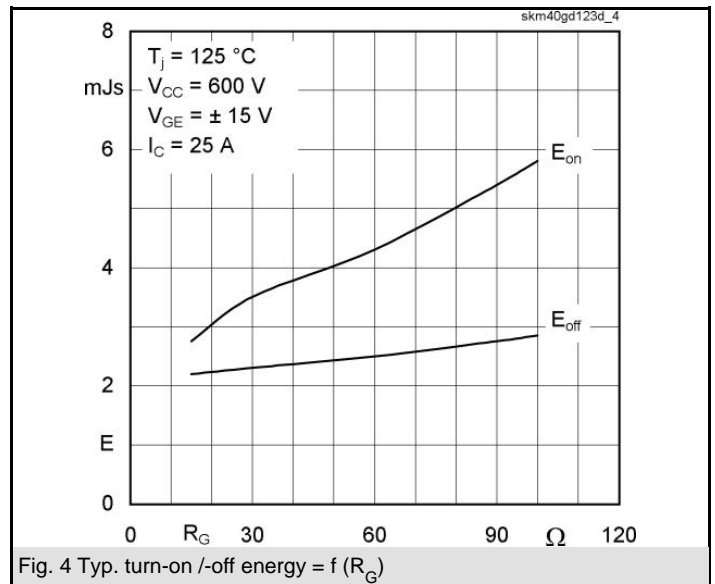
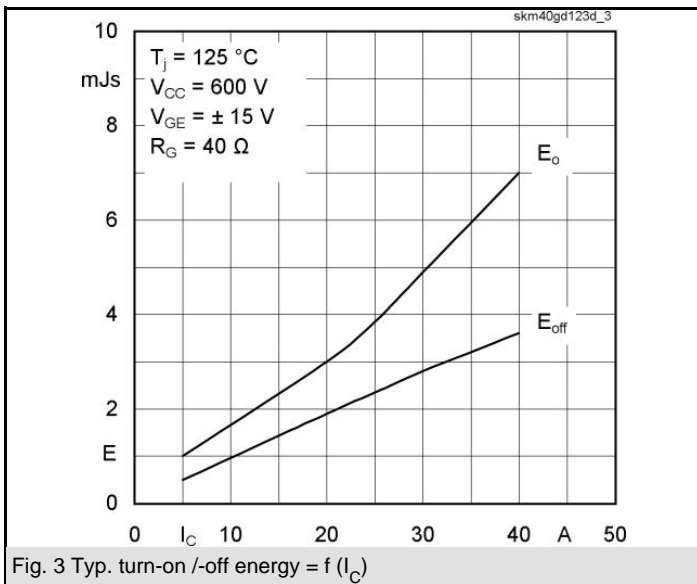
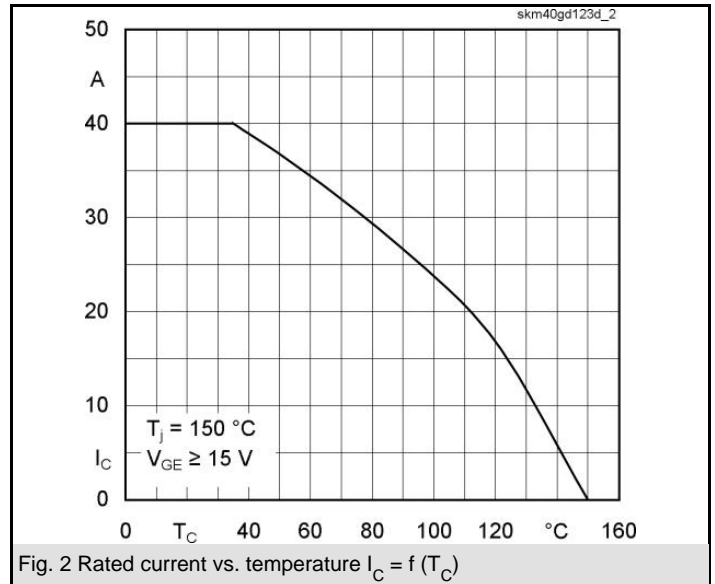
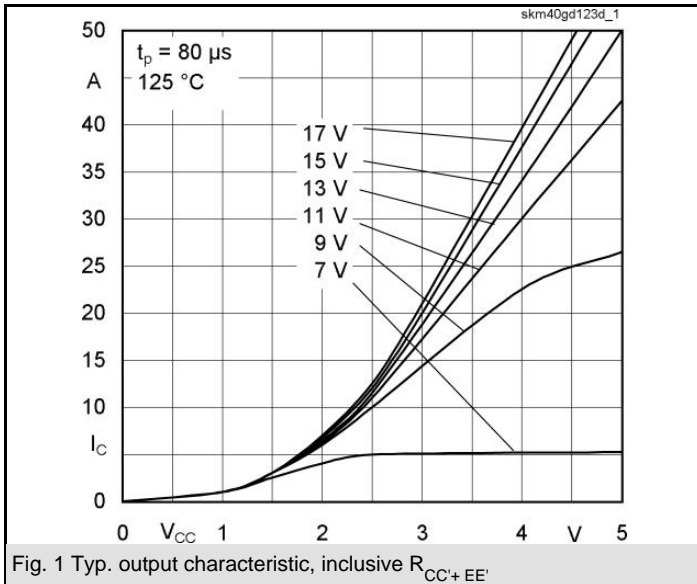
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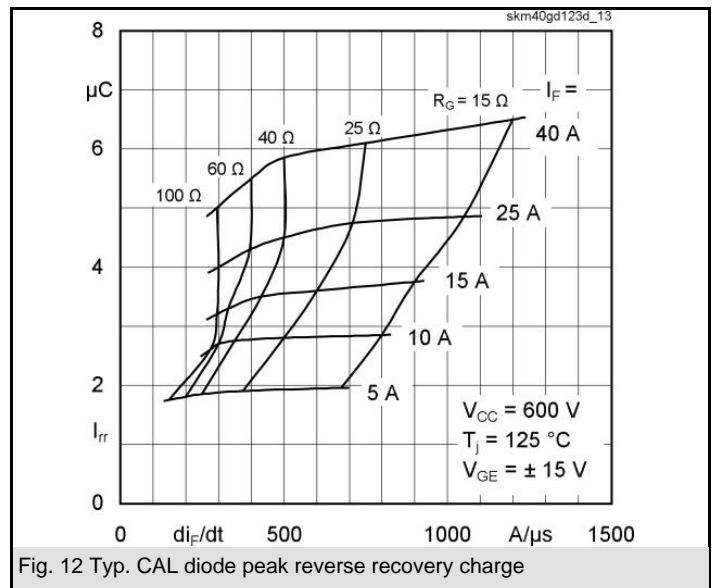
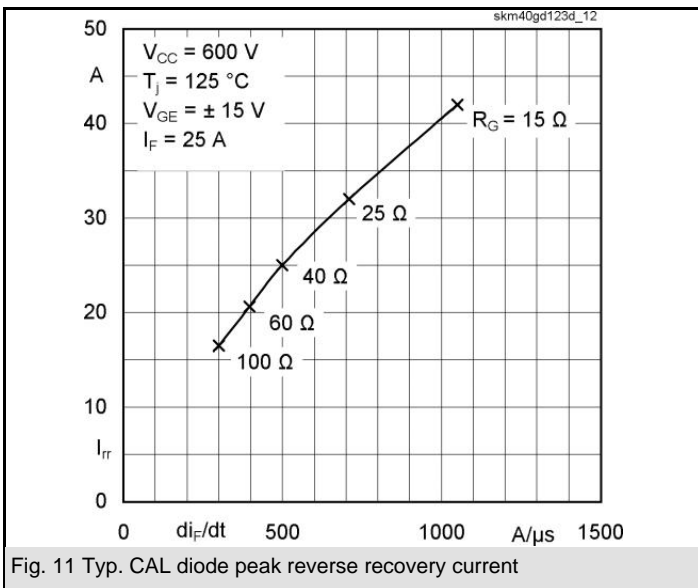
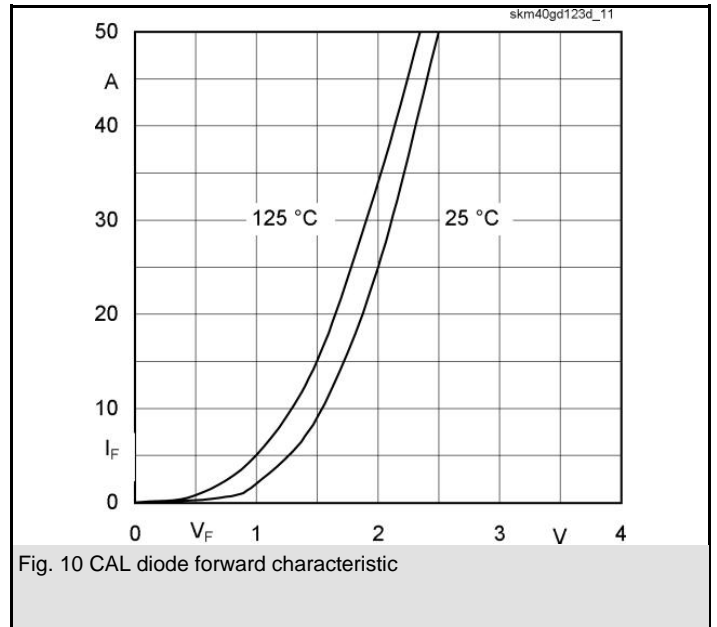
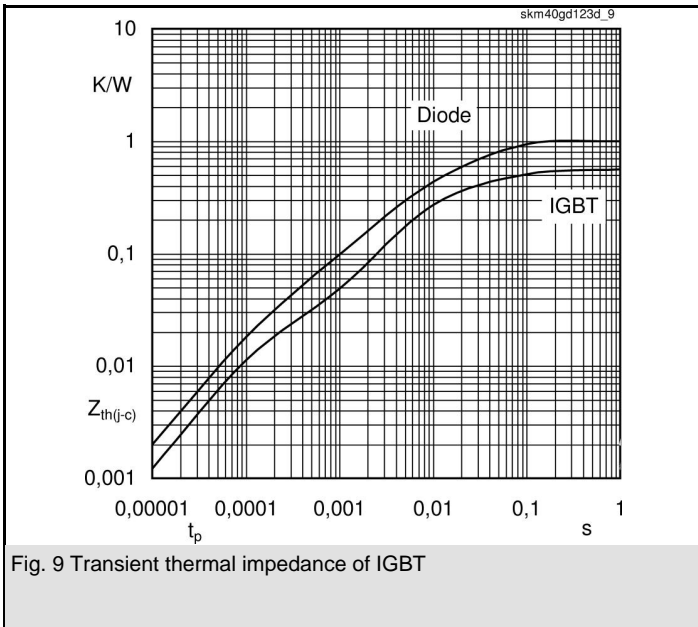
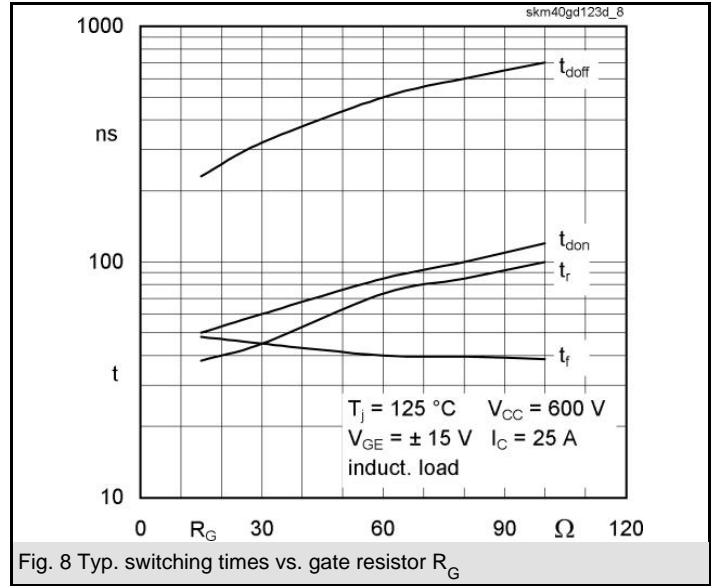
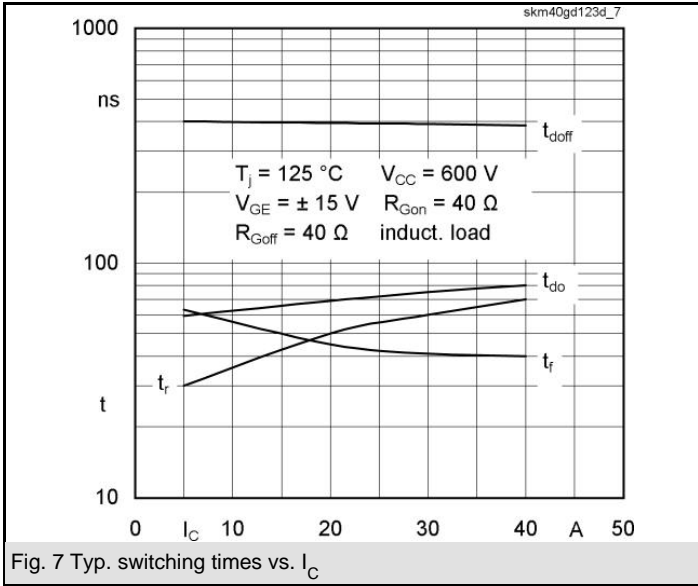


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| Z_{th} | | Conditions | Values | Units |
|----------------|---------|------------|--------|-------|
| Symbol | | | | |
| $Z_{th(j-c)I}$ | | | | |
| R_f | $i = 1$ | | 260 | mk/W |
| R_f | $i = 2$ | | 250 | mk/W |
| R_f | $i = 3$ | | 38 | mk/W |
| R_f | $i = 4$ | | 12 | mk/W |
| τ_{ai} | $i = 1$ | | 0,0447 | s |
| τ_{ai} | $i = 2$ | | 0,0079 | s |
| τ_{ai} | $i = 3$ | | 0,0015 | s |
| τ_{ai} | $i = 4$ | | 0,0002 | s |
| Symbol | | | | |
| $Z_{th(j-c)D}$ | | | | |
| R_f | $i = 1$ | | 580 | mk/W |
| R_f | $i = 2$ | | 330 | mk/W |
| R_f | $i = 3$ | | 73 | mk/W |
| R_f | $i = 4$ | | 17 | mk/W |
| τ_{ai} | $i = 1$ | | 0,054 | s |
| τ_{ai} | $i = 2$ | | 0,0089 | s |
| τ_{ai} | $i = 3$ | | 0,0018 | s |
| τ_{ai} | $i = 4$ | | 0,0002 | s |



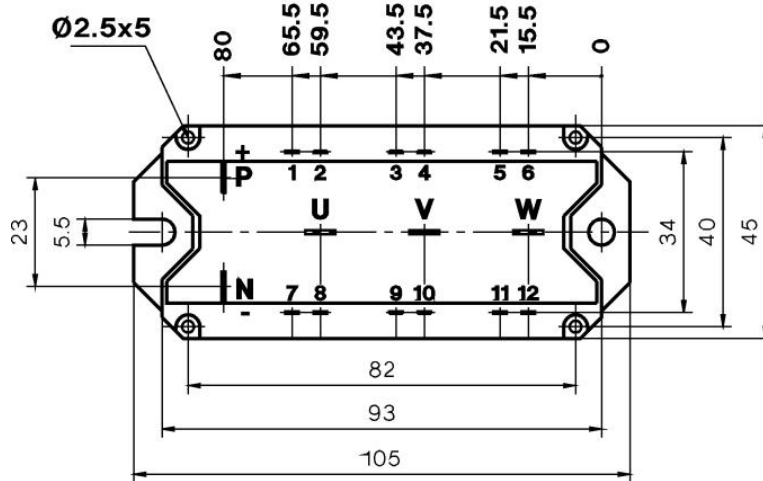
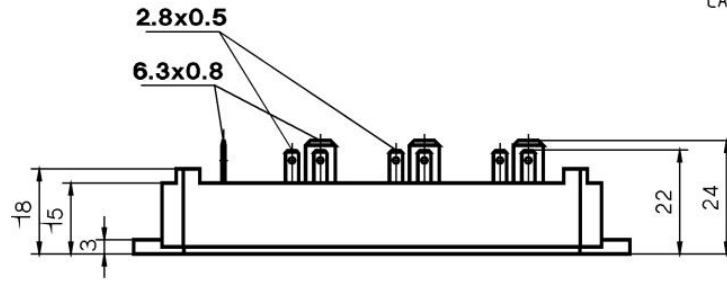


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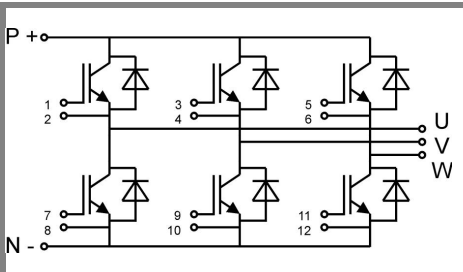
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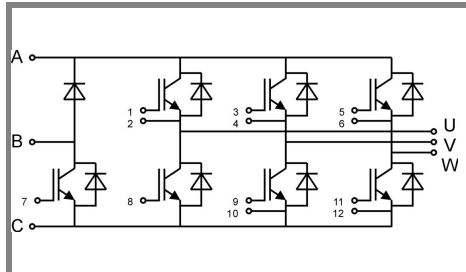


Case D 67



Case D 67

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Case D 73

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