

## Diode, Wechselrichter / Diode, Inverter

### Höchstzulässige Werte / Maximum Rated Values

|   |  |           |              |  |
|---|--|-----------|--------------|--|
| Periodische Spitzensperrspannung<br>Repetitive peak reverse voltage | $T_{vj} = 25^{\circ}\text{C}$  | $V_{RRM}$ | 1700         | V  |
| Dauergleichstrom<br>Continuous DC forward current                   |  | $I_F$     | 75           | A  |
| Periodischer Spitzenstrom<br>Repetitive peak forward current        | $t_p = 1 \text{ ms}$   | $I_{FRM}$ | 150          | A  |
| Grenzlastintegral<br>$I^2t$ - value                                 | $V_R = 0 \text{ V}, t_p = 10 \text{ ms}, T_{vj} = 125^{\circ}\text{C}$<br>$V_R = 0 \text{ V}, t_p = 10 \text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | $I^2t$    | 1350<br>1150 | $\text{A}^2\text{s}$<br>$\text{A}^2\text{s}$ |

### Charakteristische Werte / Characteristic Values

|   |   |   | min.        | typ.                 | max.  |   |
|---|---|---|-------------|----------------------|-------|---|
| Durchlassspannung<br>Forward voltage  | $I_F = 75 \text{ A}, V_{GE} = 0 \text{ V}$<br>$I_F = 75 \text{ A}, V_{GE} = 0 \text{ V}$<br>$I_F = 75 \text{ A}, V_{GE} = 0 \text{ V}$        | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $V_F$       | 1,80<br>1,90<br>1,95 | 2,20  | V<br>V<br>V                                     |
| Rückstromspitze<br>Peak reverse recovery current                                | $I_F = 75 \text{ A}, -di_F/dt = 2150 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 900 \text{ V}$<br>$V_{GE} = -15 \text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $I_{RM}$    | 105<br>125<br>130    |       | A<br>A<br>A                                     |
| Sperrverzögerungsladung<br>Recovered charge                                     | $I_F = 75 \text{ A}, -di_F/dt = 2150 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 900 \text{ V}$<br>$V_{GE} = -15 \text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $Q_r$       | 13,5<br>25,5<br>29,5 |       | $\mu\text{C}$<br>$\mu\text{C}$<br>$\mu\text{C}$ |
| Abschaltenergie pro Puls<br>Reverse recovery energy                             | $I_F = 75 \text{ A}, -di_F/dt = 2150 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 900 \text{ V}$<br>$V_{GE} = -15 \text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{rec}$   | 8,60<br>17,0<br>20,0 |       | mJ<br>mJ<br>mJ                                  |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case       | pro Diode / per diode   |   | $R_{thJC}$  |                      | 0,480 | K/W   |
| Wärmewiderstand, Gehäuse bis Kühlkörper<br>Thermal resistance, case to heatsink | pro Diode / per diode<br>$\lambda_{Paste} = 1 \text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1 \text{ W}/(\text{m}\cdot\text{K})$     |   | $R_{thCH}$  | 0,210                |       | K/W   |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions           |   |   | $T_{vj op}$ | -40                  | 150   | $^{\circ}\text{C}$                              |

## Diode, Gleichrichter / Diode, Rectifier

### Höchstzulässige Werte / Maximum Rated Values

|   |   |             |              |  |
|---|---|-------------|--------------|--|
| Periodische Spitzensperrspannung<br>Repetitive peak reverse voltage                 | $T_{vj} = 25^{\circ}\text{C}$   | $V_{RRM}$   | 1800         | V  |
| Durchlassstrom Grenzeffektivwert pro Chip<br>Maximum RMS forward current per chip   | $T_C = 80^{\circ}\text{C}$  | $I_{FRMSM}$ | 80           | A  |
| Gleichrichter Ausgang Grenzeffektivstrom<br>Maximum RMS current at rectifier output | $T_C = 80^{\circ}\text{C}$  | $I_{RMSM}$  | 140          | A  |
| Stoßstrom Grenzwert<br>Surge forward current  | $t_p = 10 \text{ ms}, T_{vj} = 25^{\circ}\text{C}$<br>$t_p = 10 \text{ ms}, T_{vj} = 125^{\circ}\text{C}$ | $I_{FSM}$   | 600<br>470   | A<br>A                                       |
| Grenzlastintegral<br>$I^2t$ - value   | $t_p = 10 \text{ ms}, T_{vj} = 25^{\circ}\text{C}$<br>$t_p = 10 \text{ ms}, T_{vj} = 125^{\circ}\text{C}$ | $I^2t$      | 1800<br>1100 | $\text{A}^2\text{s}$<br>$\text{A}^2\text{s}$ |

### Charakteristische Werte / Characteristic Values

|   |   |             | min. | typ.  | max.  |                    |
|---|---|-------------|------|-------|-------|--------------------|
| Durchlassspannung<br>Forward voltage  | $T_{vj} = 150^{\circ}\text{C}, I_F = 75 \text{ A}$  | $V_F$       |      | 1,15  |       | V                  |
| Sperrstrom<br>Reverse current   | $T_{vj} = 150^{\circ}\text{C}, V_R = 1800 \text{ V}$  | $I_R$       |      | 1,00  |       | mA                 |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case       | pro Diode / per diode   | $R_{thJC}$  |      |       | 0,650 | K/W                |
| Wärmewiderstand, Gehäuse bis Kühlkörper<br>Thermal resistance, case to heatsink | pro Diode / per diode<br>$\lambda_{Paste} = 1 \text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1 \text{ W}/(\text{m}\cdot\text{K})$ | $R_{thCH}$  |      | 0,288 |       | K/W                |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions           |   | $T_{vj op}$ | -40  |       | 150   | $^{\circ}\text{C}$ |

## IGBT, Brems-Chopper / IGBT, Brake-Chopper Höchstzulässige Werte / Maximum Rated Values

|  |   |                   |       |   |
|--|---|-------------------|-------|---|
| Kollektor-Emitter-Sperrspannung<br>Collector-emitter voltage             | $T_{vj} = 25^{\circ}\text{C}$                                 | $V_{CES}$         | 1700  | V |
| Kollektor-Dauergleichstrom<br>Continuous DC collector current            | $T_C = 100^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ | $I_{C\text{nom}}$ | 75    | A |
| Periodischer Kollektor-Spitzenstrom<br>Repetitive peak collector current | $t_P = 1\text{ ms}$   | $I_{CRM}$         | 150   | A |
| Gate-Emitter-Spitzenspannung<br>Gate-emitter peak voltage                |   | $V_{GES}$         | +/-20 | V |

## Charakteristische Werte / Characteristic Values

|   |  |   | min.               | typ.                   | max.  |             |   |
|---|--|---|--------------------|------------------------|-------|-------------|---|
| Kollektor-Emitter-Sättigungsspannung<br>Collector-emitter saturation voltage    | $I_C = 75\text{ A}, V_{GE} = 15\text{ V}$<br>$I_C = 75\text{ A}, V_{GE} = 15\text{ V}$<br>$I_C = 75\text{ A}, V_{GE} = 15\text{ V}$  | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $V_{CE\text{sat}}$ | 1,95<br>2,35<br>2,45   | 2,30  | V<br>V<br>V |   |
| Gate-Schwellenspannung<br>Gate threshold voltage                                | $I_C = 3,00\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$   |   | $V_{GEth}$         | 5,20                   | 5,80  | 6,40        | V   |
| Gateladung<br>Gate charge   | $V_{GE} = -15\text{ V} \dots +15\text{ V}$   |   | $Q_G$              | 0,90                   |       |             | $\mu\text{C}$                                   |
| Interner Gatewiderstand<br>Internal gate resistor                               | $T_{vj} = 25^{\circ}\text{C}$  |   | $R_{Gint}$         | 8,5                    |       |             | $\Omega$  |
| Eingangskapazität<br>Input capacitance  | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$   |   | $C_{ies}$          | 6,80                   |       |             | nF  |
| Rückwirkungskapazität<br>Reverse transfer capacitance                           | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$   |   | $C_{res}$          | 0,22                   |       |             | nF  |
| Kollektor-Emitter-Reststrom<br>Collector-emitter cut-off current                | $V_{CE} = 1700\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$   |   | $I_{CES}$          |                        |       | 1,0         | mA  |
| Gate-Emitter-Reststrom<br>Gate-emitter leakage current                          | $V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}, T_{vj} = 25^{\circ}\text{C}$   |   | $I_{GES}$          |                        |       | 100         | nA  |
| Einschaltverzögerungszeit, induktive Last<br>Turn-on delay time, inductive load | $I_C = 75\text{ A}, V_{CE} = 900\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 4,3\ \Omega$  | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_{don}$          | 0,23<br>0,25<br>0,26   |       |             | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| Anstiegszeit, induktive Last<br>Rise time, inductive load                       | $I_C = 75\text{ A}, V_{CE} = 900\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 4,3\ \Omega$  | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_r$              | 0,036<br>0,04<br>0,045 |       |             | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| Abschaltverzögerungszeit, induktive Last<br>Turn-off delay time, inductive load | $I_C = 75\text{ A}, V_{CE} = 900\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 4,3\ \Omega$   | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_{doff}$         | 0,46<br>0,60<br>0,64   |       |             | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| Fallzeit, induktive Last<br>Fall time, inductive load                           | $I_C = 75\text{ A}, V_{CE} = 900\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 4,3\ \Omega$   | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_f$              | 0,08<br>0,15<br>0,16   |       |             | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| Einschaltverlustenergie pro Puls<br>Turn-on energy loss per pulse               | $I_C = 75\text{ A}, V_{CE} = 900\text{ V}, L_S = 35\text{ nH}$<br>$V_{GE} = \pm 15\text{ V}, di/dt = 2150\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$<br>$R_{Gon} = 4,3\ \Omega$  | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{on}$           | 13,0<br>19,0<br>20,0   |       |             | mJ<br>mJ<br>mJ                                  |
| Abschaltverlustenergie pro Puls<br>Turn-off energy loss per pulse               | $I_C = 75\text{ A}, V_{CE} = 900\text{ V}, L_S = 35\text{ nH}$<br>$V_{GE} = \pm 15\text{ V}, du/dt = 3000\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$<br>$R_{Goff} = 4,3\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{off}$          | 14,5<br>22,0<br>28,5   |       |             | mJ<br>mJ<br>mJ                                  |
| Kurzschlußverhalten<br>SC data  | $V_{GE} \leq 15\text{ V}, V_{CE} = 1000\text{ V}$<br>$V_{CE\max} = V_{CES} - L_{SCE} \cdot di/dt$ $t_P \leq 10\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$                                 |   | $I_{SC}$           | 350                    |       |             | A   |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case       | pro IGBT / per IGBT  |   | $R_{thJC}$         |                        |       | 0,270       | K/W   |
| Wärmewiderstand, Gehäuse bis Kühlkörper<br>Thermal resistance, case to heatsink | pro IGBT / per IGBT<br>$\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$  |   | $R_{thCH}$         |                        | 0,120 |             | K/W   |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions           |  |   | $T_{vj\text{op}}$  | -40                    |       | 150         | $^{\circ}\text{C}$                              |