## IGBT, Brems-Chopper / IGBT, Brake-Chopper

**Vorläufige Daten**
**Preliminary Data**

### Höchstzulässige Werte / Maximum Rated Values

| | | | | |
|---|---|---|---|---|
| Kollektor-Emitter-Sperrspannung<br>Collector-emitter voltage | $T_{vj}$ = 25°C<br>$T_{vj}$ = -25°C | $V_{CES}$ | 3300<br>3300 | V |
| Kollektor-Dauergleichstrom<br>Continuous DC collector current | $T_C$ = 80°C, $T_{vj\,max}$ = 150°C<br>$T_C$ = 25°C, $T_{vj\,max}$ = 150°C | $I_{C\,nom}$<br>$I_C$ | 800<br>1300 | A<br>A |
| Periodischer Kollektor-Spitzenstrom<br>Repetitive peak collector current | $t_P$ = 1 ms | $I_{CRM}$ | 1600 | A |
| Gesamt-Verlustleistung<br>Total power dissipation | $T_C$ = 25°C, $T_{vj\,max}$ = 150°C | $P_{tot}$ | 9,60 | kW |
| 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 | $I_C$ = 800 A, $V_{GE}$ = 15 V<br>$I_C$ = 800 A, $V_{GE}$ = 15 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C | $V_{CE\,sat}$ | | 3,40<br>4,30 | 4,25<br>5,00 | V<br>V |
| Gate-Schwellenspannung<br>Gate threshold voltage | $I_C$ = 80,0 mA, $V_{CE}$ = $V_{GE}$, $T_{vj}$ = 25°C | | $V_{GEth}$ | 4,2 | 5,1 | 6,0 | V |
| Gateladung<br>Gate charge | $V_{GE}$ = -15 V ... +15 V, $V_{CE}$ = 1800V | | $Q_G$ | | 15,0 | | µC |
| Interner Gatewiderstand<br>Internal gate resistor | $T_{vj}$ = 25°C | | $R_{Gint}$ | | 0,63 | | Ω |
| Eingangskapazität<br>Input capacitance | f = 1 MHz, $T_{vj}$ = 25°C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | $C_{ies}$ | | 100 | | nF |
| Rückwirkungskapazität<br>Reverse transfer capacitance | f = 1 MHz, $T_{vj}$ = 25°C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | $C_{res}$ | | 5,40 | | nF |
| Kollektor-Emitter-Reststrom<br>Collector-emitter cut-off current | $V_{CE}$ = 3300 V, $V_{GE}$ = 0 V, $T_{vj}$ = 25°C | | $I_{CES}$ | | | 5,0 | mA |
| Gate-Emitter-Reststrom<br>Gate-emitter leakage current | $V_{CE}$ = 0 V, $V_{GE}$ = 20 V, $T_{vj}$ = 25°C | | $I_{GES}$ | | | 400 | nA |
| Einschaltverzögerungszeit, induktive Last<br>Turn-on delay time, inductive load | $I_C$ = 800 A, $V_{CE}$ = 1800 V<br>$V_{GE}$ = ±15 V<br>$R_{Gon}$ = 1,4 Ω, $C_{GE}$ = 150 nF | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C | $t_{d\,on}$ | | 0,28<br>0,28 | | µs<br>µs |
| Anstiegszeit, induktive Last<br>Rise time, inductive load | $I_C$ = 800 A, $V_{CE}$ = 1800 V<br>$V_{GE}$ = ±15 V<br>$R_{Gon}$ = 1,4 Ω, $C_{GE}$ = 150 nF | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C | $t_r$ | | 0,18<br>0,20 | | µs<br>µs |
| Abschaltverzögerungszeit, induktive Last<br>Turn-off delay time, inductive load | $I_C$ = 800 A, $V_{CE}$ = 1800 V<br>$V_{GE}$ = ±15 V<br>$R_{Goff}$ = 1,8 Ω, $C_{GE}$ = 150 nF | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C | $t_{d\,off}$ | | 1,55<br>1,70 | | µs<br>µs |
| Fallzeit, induktive Last<br>Fall time, inductive load | $I_C$ = 800 A, $V_{CE}$ = 1800 V<br>$V_{GE}$ = ±15 V<br>$R_{Goff}$ = 1,8 Ω, $C_{GE}$ = 150 nF | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C | $t_f$ | | 0,20<br>0,20 | | µs<br>µs |
| Einschaltverlustenergie pro Puls<br>Turn-on energy loss per pulse | $I_C$ = 800 A, $V_{CE}$ = 1800 V, $L_S$ = 40 nH<br>$V_{GE}$ = ±15 V<br>$R_{Gon}$ = 1,4 Ω, $C_{GE}$ = 150 nF | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C | $E_{on}$ | | 930<br>1450 | | mJ<br>mJ |
| Abschaltverlustenergie pro Puls<br>Turn-off energy loss per pulse | $I_C$ = 800 A, $V_{CE}$ = 1800 V, $L_S$ = 40 nH<br>$V_{GE}$ = ±15 V<br>$R_{Goff}$ = 1,8 Ω, $C_{GE}$ = 150 nF | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C | $E_{off}$ | | 870<br>1000 | | mJ<br>mJ |
| Kurzschlußverhalten<br>SC data | $V_{GE} \leq$ 15 V, $V_{CC}$ = 2500 V<br>$V_{CEmax}$ = $V_{CES}$ -$L_{sCE}$ ·di/dt | $t_P \leq$ 10 µs, $T_{vj}$ = 125°C | $I_{SC}$ | | 4000 | | A |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case | pro IGBT / per IGBT | | $R_{thJC}$ | | | 13,0 | K/kW |
| Wärmewiderstand, Gehäuse bis Kühlkörper<br>Thermal resistance, case to heatsink | pro IGBT / per IGBT<br>$\lambda_{Paste}$ = 1 W/(m·K) / $\lambda_{grease}$ = 1 W/(m·K) | | $R_{thCH}$ | | 8,00 | | K/kW |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions | | | $T_{vj\,op}$ | -40 | | 125 | °C |

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**Vorläufige Daten**
**Preliminary Data**

## Diode, Brems-Chopper / Diode, Brake-Chopper

### Höchstzulässige Werte / Maximum Rated Values

| | | | | |
|---|---|---|---|---|
| Periodische Spitzensperrspannung<br>Repetitive peak reverse voltage | $T_{vj}$ = 25°C<br>$T_{vj}$ = -25°C | $V_{RRM}$ | 3300<br>3300 | V |
| Dauergleichstrom<br>Continuous DC forward current | | $I_F$ | 800 | A |
| Periodischer Spitzenstrom<br>Repetitive peak forward current | $t_P$ = 1 ms | $I_{FRM}$ | 1600 | A |
| Grenzlastintegral<br>I²t - value | $V_R$ = 0 V, $t_P$ = 10 ms, $T_{vj}$ = 125°C | I²t | 220 | kA²s |
| Spitzenverlustleistung<br>Maximum power dissipation | $T_{vj}$ = 125°C | $P_{RQM}$ | 1600 | kW |
| Mindesteinschaltdauer<br>Minimum turn-on time | | $t_{on\ min}$ | 10,0 | µs |

### Charakteristische Werte / Characteristic Values

| | | | min. | typ. | max. | |
|---|---|---|---|---|---|---|
| Durchlassspannung<br>Forward voltage | $I_F$ = 800 A, $V_{GE}$ = 0 V<br>$I_F$ = 800 A, $V_{GE}$ = 0 V | $V_F$ | | 2,80<br>2,80 | 3,50<br>3,50 | V<br>V |
| Rückstromspitze<br>Peak reverse recovery current | $I_F$ = 800 A, - $di_F/dt$ = 4500 A/µs ($T_{vj}$=125°C)<br>$V_R$ = 1800 V<br>$V_{GE}$ = -15 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$I_{RM}$ | | 1100<br>1300 | | A<br>A |
| Sperrverzögerungsladung<br>Recovered charge | $I_F$ = 800 A, - $di_F/dt$ = 4500 A/µs ($T_{vj}$=125°C)<br>$V_R$ = 1800 V<br>$V_{GE}$ = -15 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$Q_r$ | | 500<br>900 | | µC<br>µC |
| Abschaltenergie pro Puls<br>Reverse recovery energy | $I_F$ = 800 A, - $di_F/dt$ = 4500 A/µs ($T_{vj}$=125°C)<br>$V_R$ = 1800 V<br>$V_{GE}$ = -15 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$E_{rec}$ | | 490<br>1150 | | mJ<br>mJ |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case | pro Diode / per diode | $R_{thJC}$ | | | 26,0 | K/kW |
| Wärmewiderstand, Gehäuse bis Kühlkörper<br>Thermal resistance, case to heatsink | pro Diode / per diode<br>$\lambda_{Paste}$ = 1 W/(m·K) / $\lambda_{grease}$ = 1 W/(m·K) | $R_{thCH}$ | | 16,0 | | K/kW |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions | | $T_{vj\ op}$ | -40 | | 125 | °C |