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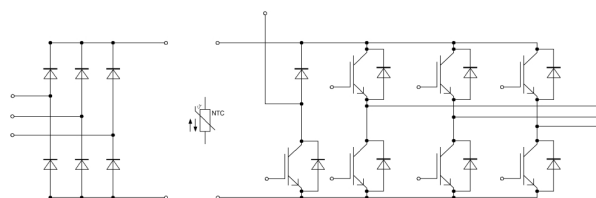
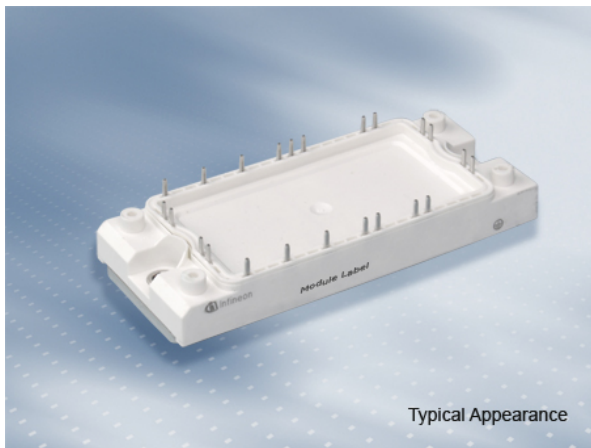
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EconoPIM™2 Modul mit Trench/Feldstopp IGBT4 und Emitter Controlled 4 Diode  
EconoPIM™2 module with Trench/Fieldstop IGBT4 and Emitter Controlled 4 diode

**Vorläufige Daten / Preliminary Data**



$V_{CES} = 1200V$   
 $I_{C\ nom} = 35A / I_{CRM} = 70A$

**Typische Anwendungen**

- Hilfsumrichter
- Medizinische Anwendungen
- Motorantriebe
- Servoumrichter

**Typical Applications**

- Auxiliary Inverters
- Medical Applications
- Motor Drives
- Servo Drives

**Elektrische Eigenschaften**

- Niedrige Schaltverluste
- $T_{vj\ op} = 150^{\circ}C$
- $V_{CEsat}$  mit positivem Temperaturkoeffizienten
- Niedriges  $V_{CEsat}$

**Electrical Features**

- Low Switching Losses
- $T_{vj\ op} = 150^{\circ}C$
- $V_{CEsat}$  with positive Temperature Coefficient
- Low  $V_{CEsat}$

**Mechanische Eigenschaften**

- Hohe Last- und thermische Wechselfestigkeit
- Kupferbodenplatte
- Lötverbindungstechnik
- Standardgehäuse

**Mechanical Features**

- High Power and Thermal Cycling Capability
- Copper Base Plate
- Solder Contact Technology
- Standard Housing

**Module Label Code**

Barcode Code 128



DMX - Code



**Content of the Code**

| Content of the Code        | Digit   |
|----------------------------|---------|
| Module Serial Number       | 1 - 5   |
| Module Material Number     | 6 - 11  |
| Production Order Number    | 12 - 19 |
| Datecode (Production Year) | 20 - 21 |
| Datecode (Production Week) | 22 - 23 |

|                 |                                 |                      |
|-----------------|---------------------------------|----------------------|
| prepared by: AS | date of publication: 2013-11-04 |                      |
| approved by: RS | revision: 2.0                   | UL approved (E83335) |



**Vorläufige Daten  
Preliminary Data**

**IGBT, Wechselrichter / IGBT, Inverter  
Höchstzulässige Werte / Maximum Rated Values**

|  |   |                    |       |   |
|--|---|--------------------|-------|---|
| Kollektor-Emitter-Sperrspannung<br>Collector-emitter voltage             | $T_{vj} = 25^{\circ}\text{C}$                                 | $V_{CES}$          | 1200  | V |
| Kollektor-Dauergleichstrom<br>Continuous DC collector current            | $T_C = 100^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ | $I_{C\text{ nom}}$ | 35    | A |
| Periodischer Kollektor-Spitzenstrom<br>Repetitive peak collector current | $t_P = 1\text{ ms}$   | $I_{CRM}$          | 70    | A |
| Gesamt-Verlustleistung<br>Total power dissipation                        | $T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$  | $P_{\text{tot}}$   | 210   | W |
| 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    | $I_C = 35\text{ A}, V_{GE} = 15\text{ V}$<br>$I_C = 35\text{ A}, V_{GE} = 15\text{ V}$<br>$I_C = 35\text{ A}, V_{GE} = 15\text{ V}$   | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $V_{CE\text{ sat}}$ | 1,85<br>2,15<br>2,25 | 2,15 | V<br>V<br>V |   |
| Gate-Schwellenspannung<br>Gate threshold voltage                                | $I_C = 1,20\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$  |   | $V_{GEth}$          | 5,2                  | 5,8  | 6,4         | V   |
| Gateladung<br>Gate charge   | $V_{GE} = -15\text{ V} \dots +15\text{ V}$  |   | $Q_G$               | 0,27                 |      |             | $\mu\text{C}$                                   |
| Interner Gatewiderstand<br>Internal gate resistor                               | $T_{vj} = 25^{\circ}\text{C}$   |   | $R_{Gint}$          | 0,0                  |      |             | $\Omega$  |
| Eingangskapazität<br>Input capacitance  | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$  |   | $C_{ies}$           | 2,00                 |      |             | nF  |
| Rückwirkungskapazität<br>Reverse transfer capacitance                           | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$  |   | $C_{res}$           | 0,07                 |      |             | nF  |
| Kollektor-Emitter-Reststrom<br>Collector-emitter cut-off current                | $V_{CE} = 1200\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$  |   | $I_{CES}$           |                      |      | 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 | $I_C = 35\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 13\ \Omega$  | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_{don}$           | 0,16<br>0,17<br>0,17 |      |             | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| Anstiegszeit, induktive Last<br>Rise time, inductive load                       | $I_C = 35\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 13\ \Omega$  | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_r$               | 0,03<br>0,04<br>0,04 |      |             | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| Abschaltverzögerungszeit, induktive Last<br>Turn-off delay time, inductive load | $I_C = 35\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 13\ \Omega$   | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_{doff}$          | 0,33<br>0,43<br>0,45 |      |             | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| Fallzeit, induktive Last<br>Fall time, inductive load                           | $I_C = 35\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 13\ \Omega$   | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_f$               | 0,08<br>0,15<br>0,17 |      |             | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| Einschaltverlustenergie pro Puls<br>Turn-on energy loss per pulse               | $I_C = 35\text{ A}, V_{CE} = 600\text{ V}, L_S = 20\text{ nH}$<br>$V_{GE} = \pm 15\text{ V}, di/dt = 1500\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$<br>$R_{Gon} = 13\ \Omega$  | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{on}$            | 3,50<br>4,60<br>5,05 |      |             | mJ<br>mJ<br>mJ                                  |
| Abschaltverlustenergie pro Puls<br>Turn-off energy loss per pulse               | $I_C = 35\text{ A}, V_{CE} = 600\text{ V}, L_S = 20\text{ nH}$<br>$V_{GE} = \pm 15\text{ V}, du/dt = 3600\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$<br>$R_{Goff} = 13\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{off}$           | 2,10<br>3,10<br>3,40 |      |             | mJ<br>mJ<br>mJ                                  |
| Kurzschlußverhalten<br>SC data  | $V_{GE} \leq 15\text{ V}, V_{CC} = 800\text{ V}$<br>$V_{CE\text{ max}} = V_{CES} - L_{SCE} \cdot di/dt$ $t_P \leq 10\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$                          |   | $I_{SC}$            | 130                  |      |             | A   |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case       | pro IGBT / per IGBT   |   | $R_{thJC}$          |                      |      | 0,72        | K/W   |
| Wärmewiderstand, Gehäuse bis Kühlkörper<br>Thermal resistance, case to heatsink | pro IGBT / per IGBT<br>$\lambda_{\text{Paste}} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{\text{grease}} = 1\text{ W}/(\text{m}\cdot\text{K})$                                     |   | $R_{thCH}$          | 0,325                |      |             | K/W   |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions           |   |   | $T_{vj\text{ op}}$  | -40                  |      | 150         | $^{\circ}\text{C}$                              |

|                 |                                 |
|-----------------|---------------------------------|
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| approved by: RS | revision: 2.0                   |



**Vorläufige Daten  
Preliminary Data**

**Diode, Wechselrichter / Diode, Inverter**

**Höchstzulässige Werte / Maximum Rated Values**

|   |  |           |      |                      |
|---|--|-----------|------|----------------------|
| Periodische Spitzensperrspannung<br>Repetitive peak reverse voltage | $T_{vj} = 25^{\circ}\text{C}$  | $V_{RRM}$ | 1200 | V                    |
| Dauergleichstrom<br>Continuous DC forward current                   |  | $I_F$     | 35   | A                    |
| Periodischer Spitzenstrom<br>Repetitive peak forward current        | $t_P = 1\text{ ms}$  | $I_{FRM}$ | 70   | A                    |
| Grenzlastintegral<br>$I^2t$ - value                                 | $V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$ | $I^2t$    | 240  | $\text{A}^2\text{s}$ |

**Charakteristische Werte / Characteristic Values**

|   |   |   | min.               | typ.                 | max. |   |
|---|---|---|--------------------|----------------------|------|---|
| Durchlassspannung<br>Forward voltage  | $I_F = 35\text{ A}, V_{GE} = 0\text{ V}$<br>$I_F = 35\text{ A}, V_{GE} = 0\text{ V}$<br>$I_F = 35\text{ A}, V_{GE} = 0\text{ V}$          | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $V_F$              | 1,70<br>1,65<br>1,65 | 2,15 | V<br>V<br>V                                     |
| Rückstromspitze<br>Peak reverse recovery current                                | $I_F = 35\text{ A}, -di_F/dt = 1500\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600\text{ V}$<br>$V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $I_{RM}$           | 35,0<br>39,0<br>40,0 |      | A<br>A<br>A                                     |
| Sperrverzögerungsladung<br>Recovered charge                                     | $I_F = 35\text{ A}, -di_F/dt = 1500\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600\text{ V}$<br>$V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $Q_r$              | 3,40<br>6,30<br>7,20 |      | $\mu\text{C}$<br>$\mu\text{C}$<br>$\mu\text{C}$ |
| Abschaltenergie pro Puls<br>Reverse recovery energy                             | $I_F = 35\text{ A}, -di_F/dt = 1500\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600\text{ V}$<br>$V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{rec}$          | 1,15<br>2,25<br>2,55 |      | mJ<br>mJ<br>mJ                                  |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case       | pro Diode / per diode   |   | $R_{thJC}$         |                      | 1,00 | K/W   |
| Wärmewiderstand, Gehäuse bis Kühlkörper<br>Thermal resistance, case to heatsink | pro Diode / per diode<br>$\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$   |   | $R_{thCH}$         | 0,455                |      | K/W   |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions           |   |   | $T_{vj\text{ op}}$ | -40                  | 150  | $^{\circ}\text{C}$                              |

**Diode, Gleichrichter / Diode, Rectifier**

**Höchstzulässige Werte / Maximum Rated Values**

|   |   |             |             |  |
|---|---|-------------|-------------|--|
| Periodische Spitzensperrspannung<br>Repetitive peak reverse voltage                 | $T_{vj} = 25^{\circ}\text{C}$   | $V_{RRM}$   | 1600        | V  |
| Durchlassstrom Grenzeffektivwert pro Chip<br>Maximum RMS forward current per chip   | $T_C = 80^{\circ}\text{C}$  | $I_{FRMSM}$ | 70          | A  |
| Gleichrichter Ausgang Grenzeffektivstrom<br>Maximum RMS current at rectifier output | $T_C = 80^{\circ}\text{C}$  | $I_{RMSM}$  | 80          | A  |
| Stoßstrom Grenzwert<br>Surge forward current  | $t_p = 10\text{ ms}, T_{vj} = 25^{\circ}\text{C}$<br>$t_p = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | $I_{FSM}$   | 450<br>370  | A<br>A                                       |
| Grenzlastintegral<br>$I^2t$ - value   | $t_p = 10\text{ ms}, T_{vj} = 25^{\circ}\text{C}$<br>$t_p = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | $I^2t$      | 1000<br>685 | $\text{A}^2\text{s}$<br>$\text{A}^2\text{s}$ |

**Charakteristische Werte / Characteristic Values**

|   |   |                    | min. | typ. | max. |                    |
|---|---|--------------------|------|------|------|--------------------|
| Durchlassspannung<br>Forward voltage  | $T_{vj} = 150^{\circ}\text{C}, I_F = 35\text{ A}$   | $V_F$              |      | 0,95 |      | V                  |
| Sperrstrom<br>Reverse current   | $T_{vj} = 150^{\circ}\text{C}, V_R = 1600\text{ V}$   | $I_R$              |      | 1,00 |      | mA                 |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case       | pro Diode / per diode   | $R_{thJC}$         |      |      | 0,85 | K/W                |
| Wärmewiderstand, Gehäuse bis Kühlkörper<br>Thermal resistance, case to heatsink | pro Diode / per diode<br>$\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$ | $R_{thCH}$         |      | 0,38 |      | K/W                |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions           |   | $T_{vj\text{ op}}$ | -40  |      | 150  | $^{\circ}\text{C}$ |

|                 |                                 |
|-----------------|---------------------------------|
| prepared by: AS | date of publication: 2013-11-04 |
| approved by: RS | revision: 2.0                   |



**Vorläufige Daten  
Preliminary Data**

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

|  |   |                            |          |        |
|--|---|----------------------------|----------|--------|
| Kollektor-Emitter-Sperrspannung<br>Collector-emitter voltage             | $T_{vj} = 25^{\circ}\text{C}$   | $V_{CES}$                  | 1200     | V      |
| Kollektor-Dauergleichstrom<br>Continuous DC collector current            | $T_C = 100^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$<br>$T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ | $I_{C\text{nom}}$<br>$I_C$ | 15<br>28 | A<br>A |
| Periodischer Kollektor-Spitzenstrom<br>Repetitive peak collector current | $t_P = 1\text{ ms}$   | $I_{CRM}$                  | 30       | A      |
| Gesamt-Verlustleistung<br>Total power dissipation                        | $T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$  | $P_{\text{tot}}$           | 105      | W      |
| 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    | $I_C = 15\text{ A}, V_{GE} = 15\text{ V}$<br>$I_C = 15\text{ A}, V_{GE} = 15\text{ V}$<br>$I_C = 15\text{ A}, V_{GE} = 15\text{ V}$                      | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $V_{CE\text{sat}}$ | 1,85<br>2,15<br>2,25    | 2,15 | V<br>V<br>V |   |
| Gate-Schwellenspannung<br>Gate threshold voltage                                | $I_C = 0,48\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$   |   | $V_{GEth}$         | 5,2                     | 5,8  | 6,4         | V   |
| Gateladung<br>Gate charge   | $V_{GE} = -15\text{ V} \dots +15\text{ V}$   |   | $Q_G$              | 0,12                    |      |             | $\mu\text{C}$                                   |
| Interner Gatewiderstand<br>Internal gate resistor                               | $T_{vj} = 25^{\circ}\text{C}$  |   | $R_{Gint}$         | 0,0                     |      |             | $\Omega$  |
| Eingangskapazität<br>Input capacitance  | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$   |   | $C_{ies}$          | 0,89                    |      |             | nF  |
| Rückwirkungskapazität<br>Reverse transfer capacitance                           | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$   |   | $C_{res}$          | 0,03                    |      |             | nF  |
| Kollektor-Emitter-Reststrom<br>Collector-emitter cut-off current                | $V_{CE} = 1200\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$   |   | $I_{CES}$          |                         |      | 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 | $I_C = 15\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 43\ \Omega$   | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_{don}$          | 0,065<br>0,065<br>0,065 |      |             | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| Anstiegszeit, induktive Last<br>Rise time, inductive load                       | $I_C = 15\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 43\ \Omega$   | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_r$              | 0,06<br>0,065<br>0,065  |      |             | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| Abschaltverzögerungszeit, induktive Last<br>Turn-off delay time, inductive load | $I_C = 15\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 43\ \Omega$  | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_{doff}$         | 0,21<br>0,28<br>0,285   |      |             | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| Fallzeit, induktive Last<br>Fall time, inductive load                           | $I_C = 15\text{ A}, V_{CE} = 600\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 43\ \Omega$  | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $t_f$              | 0,17<br>0,20<br>0,225   |      |             | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| Einschaltverlustenergie pro Puls<br>Turn-on energy loss per pulse               | $I_C = 15\text{ A}, V_{CE} = 600\text{ V}, L_S = 20\text{ nH}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 43\ \Omega$                                   | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{on}$           | 1,35<br>1,80<br>2,00    |      |             | mJ<br>mJ<br>mJ                                  |
| Abschaltverlustenergie pro Puls<br>Turn-off energy loss per pulse               | $I_C = 15\text{ A}, V_{CE} = 600\text{ V}, L_S = 20\text{ nH}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 43\ \Omega$                                  | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{off}$          | 0,85<br>1,20<br>1,35    |      |             | mJ<br>mJ<br>mJ                                  |
| Kurzschlußverhalten<br>SC data  | $V_{GE} \leq 15\text{ V}, V_{CC} = 800\text{ V}$<br>$V_{CEmax} = V_{CES} - L_{SCE} \cdot di/dt$ $t_P \leq 10\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$ |   | $I_{SC}$           | 55                      |      |             | A   |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case       | pro IGBT / per IGBT  |   | $R_{thJC}$         |                         |      | 1,40        | K/W   |
| Wärmewiderstand, Gehäuse bis Kühlkörper<br>Thermal resistance, case to heatsink | pro IGBT / per IGBT<br>$\lambda_{\text{Paste}} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{\text{grease}} = 1\text{ W}/(\text{m}\cdot\text{K})$    |   | $R_{thCH}$         | 0,63                    |      |             | K/W   |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions           |  |   | $T_{vj\text{op}}$  | -40                     |      | 150         | $^{\circ}\text{C}$                              |

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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 | $T_{vj} = 80^{\circ}\text{C}$  | $V_{RRM}$ | 1200 | V                |
| Dauergleichstrom<br>Continuous DC forward current                   |  | $I_F$     | 10   | A                |
| Periodischer Spitzenstrom<br>Repetitive peak forward current        | $t_P = 1\text{ ms}$  | $I_{FRM}$ | 20   | A                |
| Grenzlastintegral<br>$I^2t$ - value                                 | $V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$ | $I^2t$    | 20,0 | A <sup>2</sup> s |

**Charakteristische Werte / Characteristic Values**

|   |   |   | min.               | typ.                 | max. |   |
|---|---|---|--------------------|----------------------|------|---|
| Durchlassspannung<br>Forward voltage  | $I_F = 10\text{ A}, V_{GE} = 0\text{ V}$<br>$I_F = 10\text{ A}, V_{GE} = 0\text{ V}$<br>$I_F = 10\text{ A}, V_{GE} = 0\text{ V}$        | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $V_F$              | 1,80<br>1,85<br>1,85 | 2,25 | V<br>V<br>V                                     |
| Rückstromspitze<br>Peak reverse recovery current                                | $I_F = 10\text{ A}, -di_F/dt = 400\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600\text{ V}$                           | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $I_{RM}$           | 14,0<br>15,0<br>15,0 |      | A<br>A<br>A                                     |
| Sperrverzögerungsladung<br>Recovered charge                                     | $I_F = 10\text{ A}, -di_F/dt = 400\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600\text{ V}$                           | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $Q_r$              | 1,00<br>1,80<br>2,00 |      | $\mu\text{C}$<br>$\mu\text{C}$<br>$\mu\text{C}$ |
| Abschaltenergie pro Puls<br>Reverse recovery energy                             | $I_F = 10\text{ A}, -di_F/dt = 400\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 600\text{ V}$                           | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{rec}$          | 0,26<br>0,56<br>0,64 |      | mJ<br>mJ<br>mJ                                  |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case       | pro Diode / per diode   |   | $R_{thJC}$         |                      | 2,30 | K/W   |
| Wärmewiderstand, Gehäuse bis Kühlkörper<br>Thermal resistance, case to heatsink | pro Diode / per diode<br>$\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$ |   | $R_{thCH}$         | 1,05                 |      | K/W   |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions           |   |   | $T_{vj\text{ op}}$ | -40                  | 150  | $^{\circ}\text{C}$                              |

**NTC-Widerstand / NTC-Thermistor**

**Charakteristische Werte / Characteristic Values**

|  |   |  | min.         | typ. | max. |            |
|--|---|--|--------------|------|------|------------|
| Nennwiderstand<br>Rated resistance       | $T_C = 25^{\circ}\text{C}$                                    |  | $R_{25}$     | 5,00 |      | k $\Omega$ |
| Abweichung von R100<br>Deviation of R100 | $T_C = 100^{\circ}\text{C}, R_{100} = 493\ \Omega$            |  | $\Delta R/R$ | -5   | 5    | %          |
| Verlustleistung<br>Power dissipation     | $T_C = 25^{\circ}\text{C}$                                    |  | $P_{25}$     |      | 20,0 | mW         |
| B-Wert<br>B-value                        | $R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15\text{ K}))]$  |  | $B_{25/50}$  | 3375 |      | K          |
| B-Wert<br>B-value                        | $R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298,15\text{ K}))]$  |  | $B_{25/80}$  | 3411 |      | K          |
| B-Wert<br>B-value                        | $R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298,15\text{ K}))]$ |  | $B_{25/100}$ | 3433 |      | K          |

Angaben gemäß gültiger Application Note.  
Specification according to the valid application note.

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**Vorläufige Daten  
Preliminary Data**

**Modul / Module**

|  |  |  |                                |            |          |
|--|--|--|--------------------------------|------------|----------|
| Isolations-Prüfspannung<br>Isolation test voltage                                      | RMS, f = 50 Hz, t = 1 min.   | V <sub>ISOL</sub>                            | 2,5                            |            | kV       |
| Material Modulgrundplatte<br>Material of module baseplate                              |  |  | Cu                             |            |          |
| Innere Isolation<br>Internal isolation   | Basisisolierung (Schutzklasse 1, EN61140)<br>basic insulation (class 1, IEC 61140)   |  | Al <sub>2</sub> O <sub>3</sub> |            |          |
| Kriechstrecke<br>Creepage distance   | Kontakt - Kühlkörper / terminal to heatsink<br>Kontakt - Kontakt / terminal to terminal  |  | 10,0                           |            | mm       |
| Luftstrecke<br>Clearance   | Kontakt - Kühlkörper / terminal to heatsink<br>Kontakt - Kontakt / terminal to terminal  |  | 7,5                            |            | mm       |
| Vergleichszahl der Kriechwegbildung<br>Comperative tracking index                      |  | CTI  | > 200                          |            |          |
| min.    typ.    max.   |  |  |                                |            |          |
| Wärmewiderstand, Gehäuse bis Kühlkörper<br>Thermal resistance, case to heatsink        | pro Modul / per module<br>$\lambda_{\text{Paste}} = 1 \text{ W/(m}\cdot\text{K)} / \lambda_{\text{grease}} = 1 \text{ W/(m}\cdot\text{K)}$ | R <sub>thCH</sub>                            | 0,02                           |            | K/W      |
| Modulstreuintduktivität<br>Stray inductance module                                     |  | L <sub>sCE</sub>                             | 35                             |            | nH       |
| Modulleitungswiderstand, Anschlüsse - Chip<br>Module lead resistance, terminals - chip | T <sub>c</sub> = 25°C, pro Schalter / per switch   | R <sub>CC'+EE'</sub><br>R <sub>AA'+CC'</sub> | 4,00<br>3,00                   |            | mΩ       |
| Höchstzulässige Sperrschichttemperatur<br>Maximum junction temperature                 | Wechselrichter, Brems-Chopper / inverter, brake-chopper<br>Gleichrichter / rectifier   | T <sub>vj max</sub>                          |                                | 175<br>150 | °C<br>°C |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions                  | Wechselrichter, Brems-Chopper / inverter, brake-chopper<br>Gleichrichter / rectifier   | T <sub>vj op</sub>                           | -40<br>-40                     | 150<br>150 | °C<br>°C |
| Lagertemperatur<br>Storage temperature   |  | T <sub>stg</sub>                             | -40                            | 125        | °C       |
| Anzugsdrehmoment f. Modulmontage<br>Mounting torque for modul mounting                 | Schraube M5 - Montage gem. gültiger Applikationsschrift<br>Screw M5 - Mounting according to valid application note                         | M  | 3,00                           | -          | 6,00 Nm  |
| Gewicht<br>Weight  |  | G  | 180                            |            | g        |

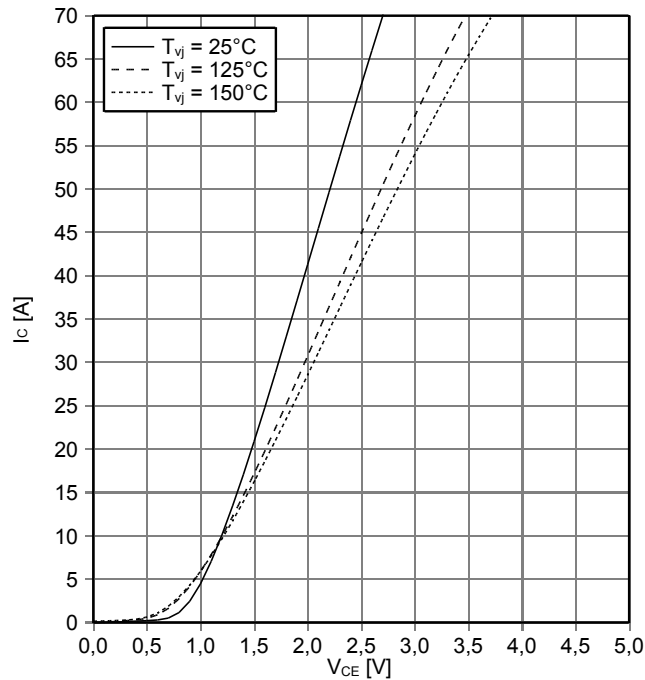
bei Betrieb mit V<sub>ge</sub> = 0V/+15V empfehlen wir einen R<sub>gon,min</sub> von 27 Ohm und eine R<sub>goff,min</sub> von 27 Ohm (siehe AN 2006-01)  
for operation with V<sub>ge</sub>= 0V/+15V we recommend a R<sub>gon,min</sub> of 27 ohms and a R<sub>goff,min</sub> of 27 ohms (see AN 2006-01)

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

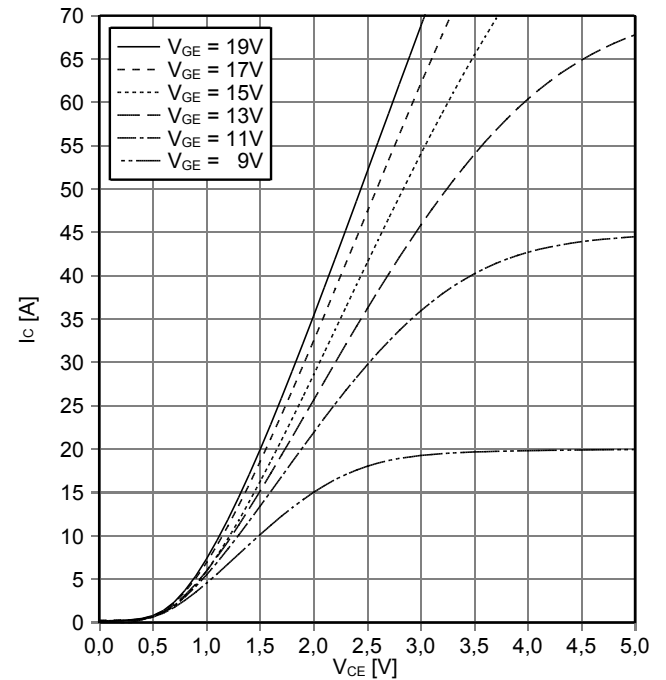
**Ausgangskennlinie IGBT, Wechselrichter (typisch)**  
**output characteristic IGBT, Inverter (typical)**

$I_C = f(V_{CE})$   
 $V_{GE} = 15\text{ V}$



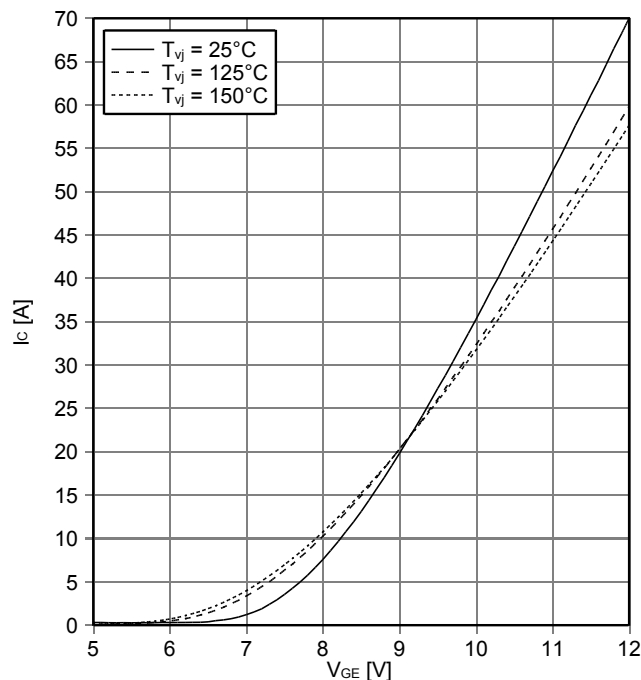
**Ausgangskennlinienfeld IGBT, Wechselrichter (typisch)**  
**output characteristic IGBT, Inverter (typical)**

$I_C = f(V_{CE})$   
 $T_{vj} = 150^\circ\text{C}$



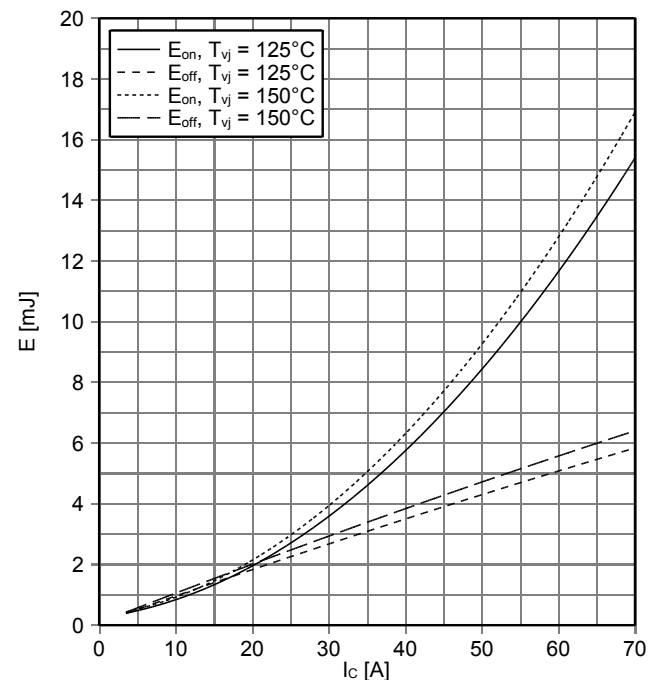
**Übertragungscharakteristik IGBT, Wechselrichter (typisch)**  
**transfer characteristic IGBT, Inverter (typical)**

$I_C = f(V_{GE})$   
 $V_{CE} = 20\text{ V}$



**Schaltverluste IGBT, Wechselrichter (typisch)**  
**switching losses IGBT, Inverter (typical)**

$E_{on} = f(I_C), E_{off} = f(I_C)$   
 $V_{GE} = \pm 15\text{ V}, R_{Gon} = 13\ \Omega, R_{Goff} = 13\ \Omega, V_{CE} = 600\text{ V}$



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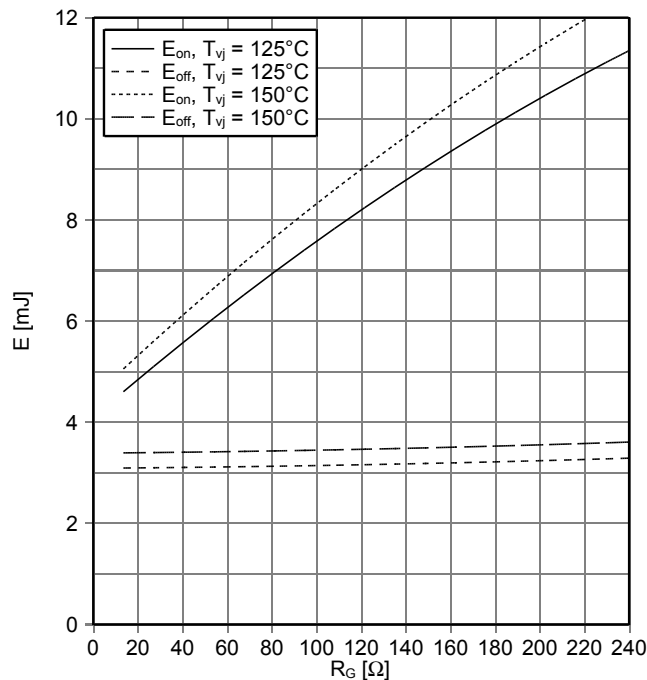




**Vorläufige Daten  
Preliminary Data**

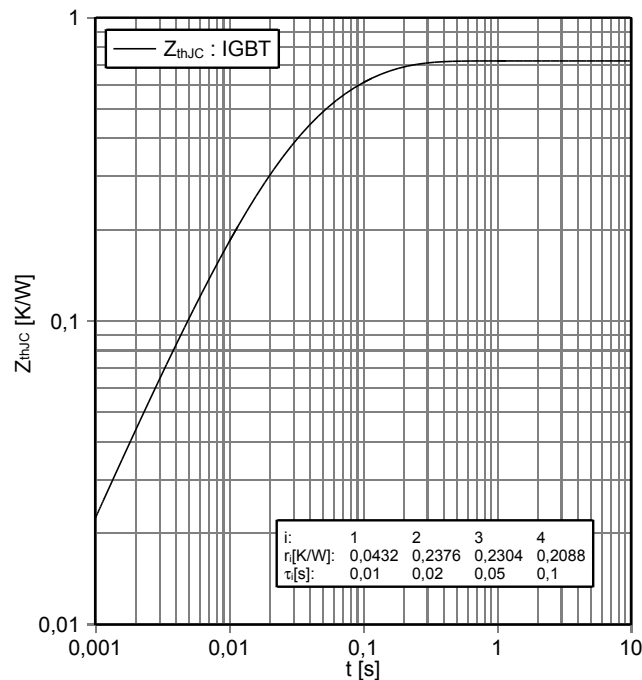
**Schaltverluste IGBT, Wechselrichter (typisch)  
switching losses IGBT, Inverter (typical)**

$E_{on} = f(R_G), E_{off} = f(R_G)$   
 $V_{GE} = \pm 15\text{ V}, I_C = 35\text{ A}, V_{CE} = 600\text{ V}$



**Transienter Wärmewiderstand IGBT, Wechselrichter  
transient thermal impedance IGBT, Inverter**

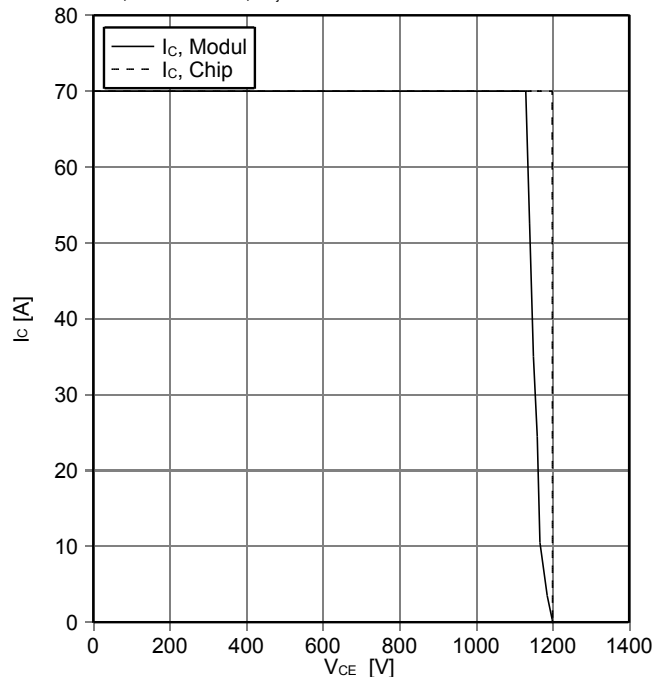
$Z_{thJC} = f(t)$



**Sicherer Rückwärts-Arbeitsbereich IGBT, Wechselrichter  
(RBSOA)**

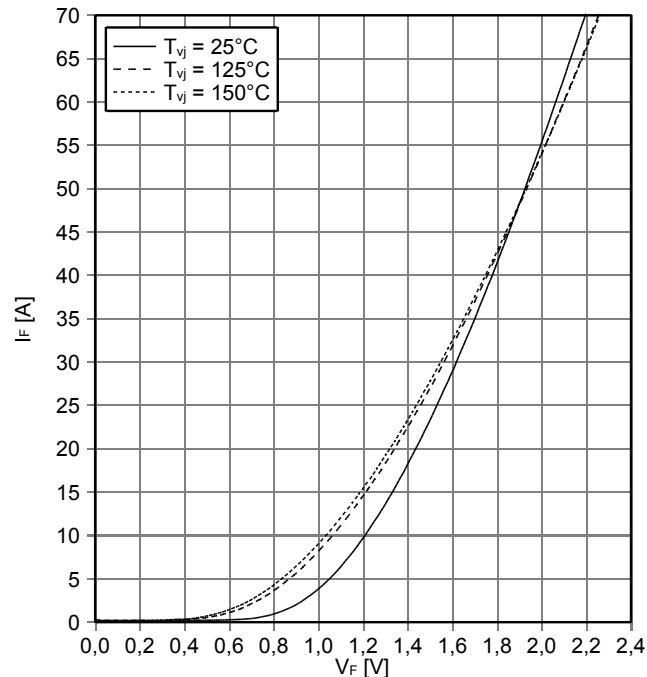
**reverse bias safe operating area IGBT, Inverter (RBSOA)**

$I_C = f(V_{CE})$   
 $V_{GE} = \pm 15\text{ V}, R_{Goff} = 13\ \Omega, T_{vj} = 150^\circ\text{C}$



**Durchlasskennlinie der Diode, Wechselrichter (typisch)  
forward characteristic of Diode, Inverter (typical)**

$I_F = f(V_F)$



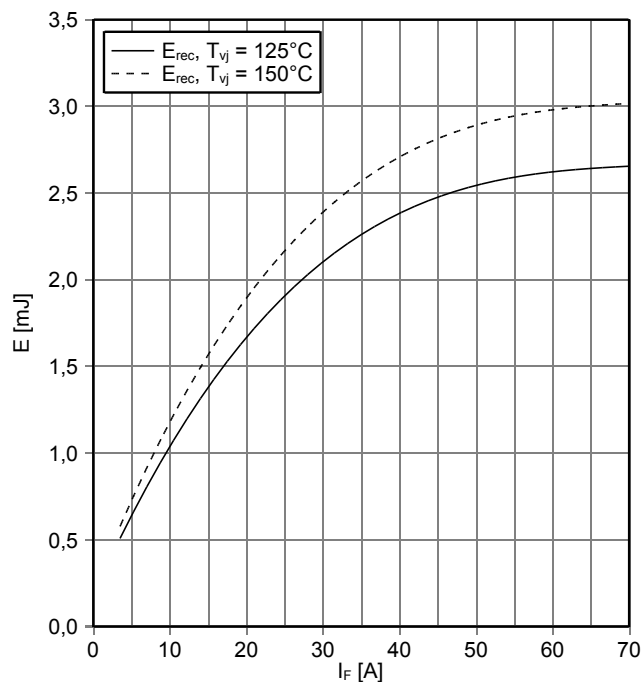
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**Vorläufige Daten**  
**Preliminary Data**

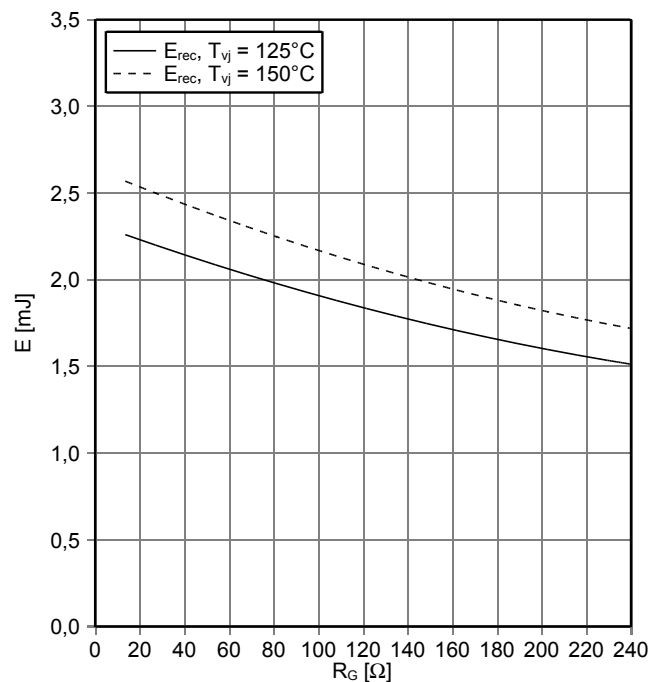
**Schaltverluste Diode, Wechselrichter (typisch)**  
**switching losses Diode, Inverter (typical)**

$E_{rec} = f(I_F)$   
 $R_{Gon} = 13 \Omega, V_{CE} = 600 V$



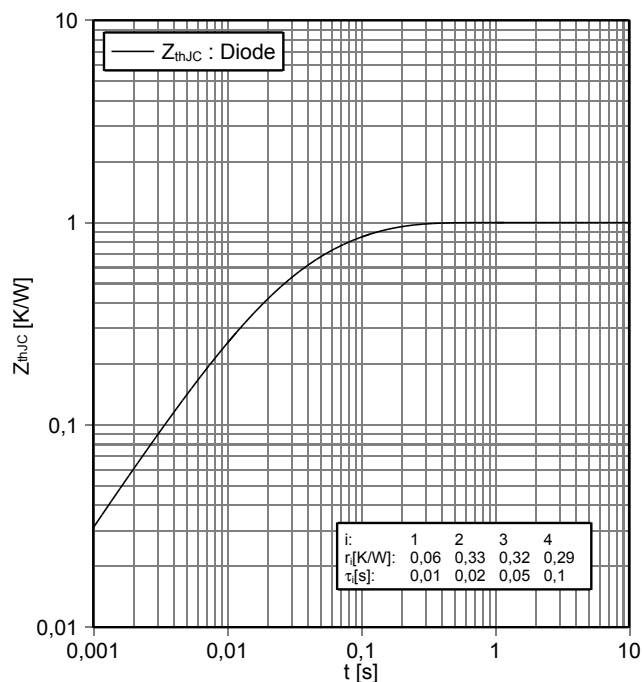
**Schaltverluste Diode, Wechselrichter (typisch)**  
**switching losses Diode, Inverter (typical)**

$E_{rec} = f(R_G)$   
 $I_F = 35 A, V_{CE} = 600 V$



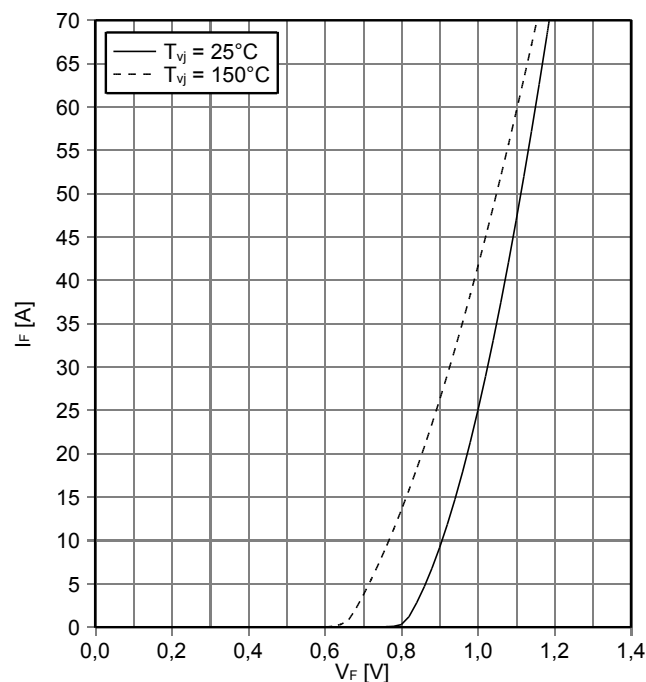
**Transienter Wärmewiderstand Diode, Wechselrichter**  
**transient thermal impedance Diode, Inverter**

$Z_{thJC} = f(t)$



**Durchlasskennlinie der Diode, Gleichrichter (typisch)**  
**forward characteristic of Diode, Rectifier (typical)**

$I_F = f(V_F)$

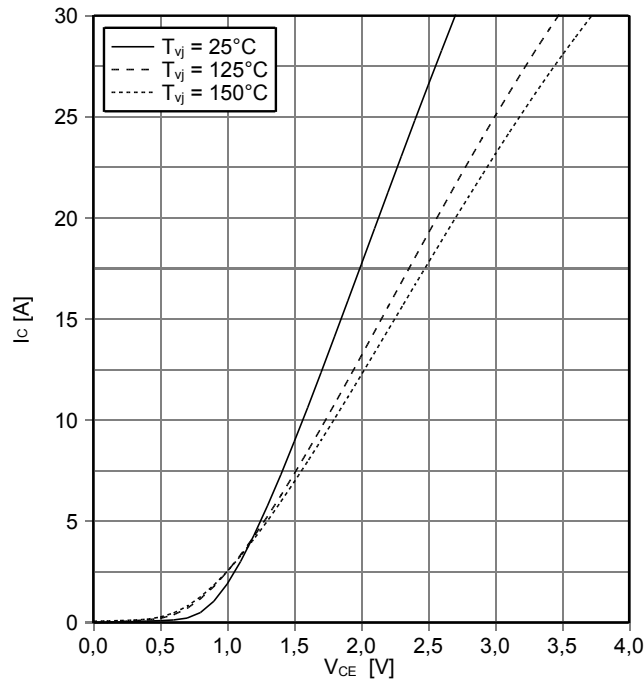


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**Vorläufige Daten  
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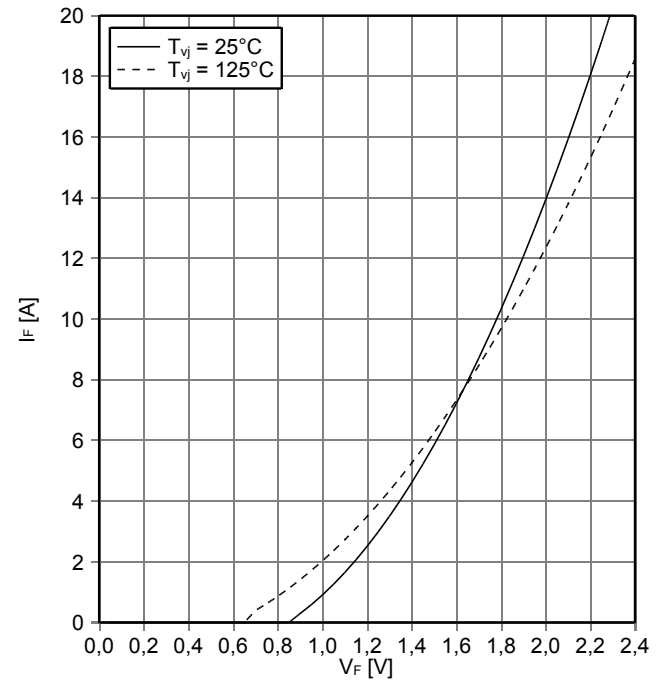
**Ausgangskennlinie IGBT, Brems-Chopper (typisch)**  
**output characteristic IGBT, Brake-Chopper (typical)**

$I_C = f(V_{CE})$   
 $V_{GE} = 15\text{ V}$



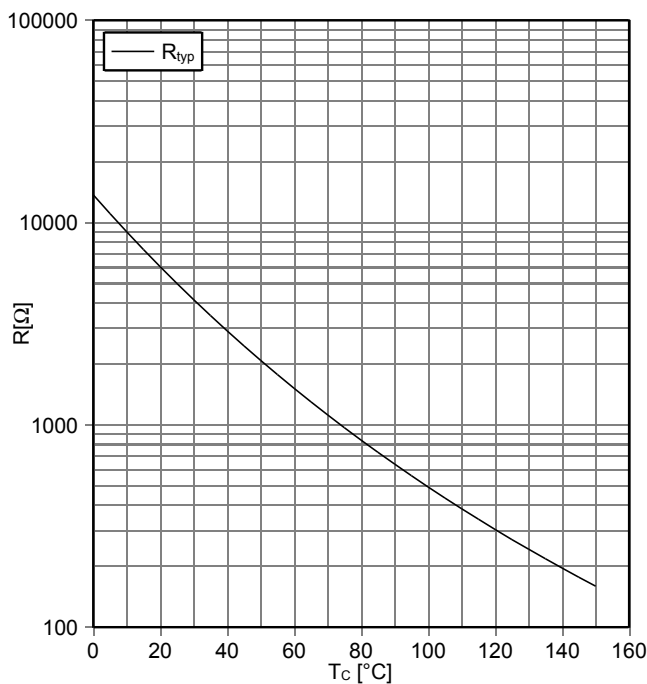
**Durchlasskennlinie der Diode, Brems-Chopper (typisch)**  
**forward characteristic of Diode, Brake-Chopper (typical)**

$I_F = f(V_F)$



**NTC-Widerstand-Temperaturkennlinie (typisch)**  
**NTC-Thermistor-temperature characteristic (typical)**

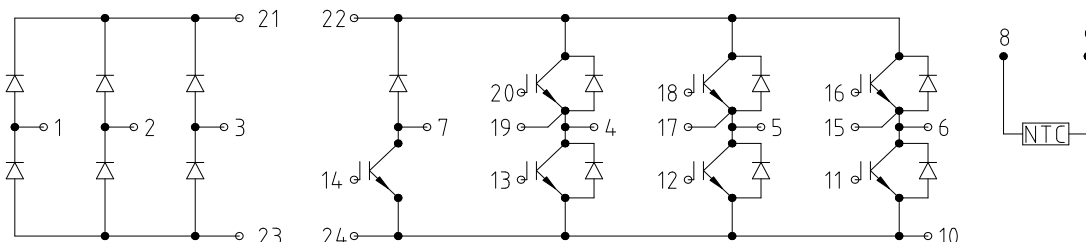
$R = f(T)$



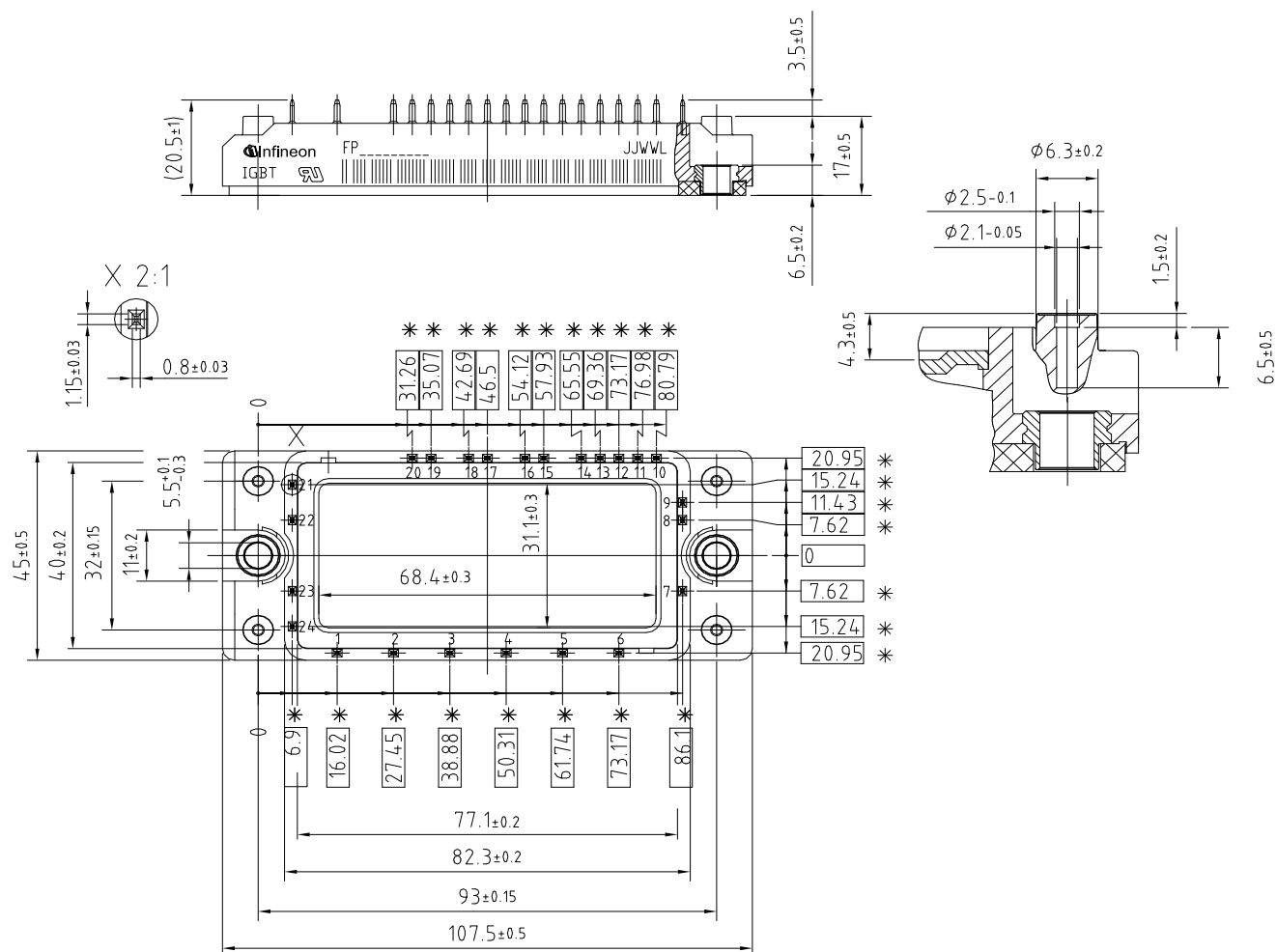
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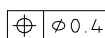
### Schaltplan / circuit\_diagram\_headline



### Gehäuseabmessungen / package outlines



\* = alle Maße mit einer Toleranz von  
\* = all dimensions with tolerance of



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**Vorläufige Daten  
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- the conclusion of Quality Agreements;
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