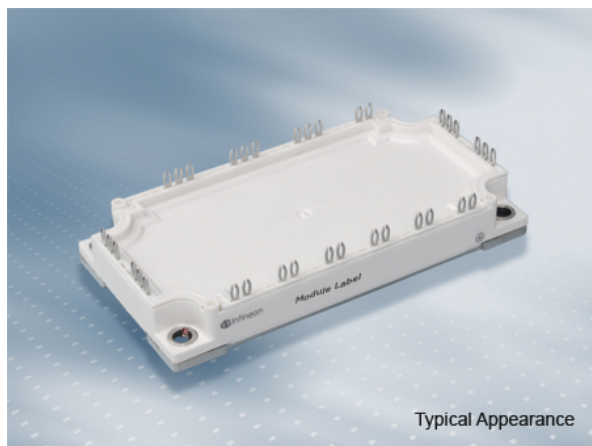


EconoPACK™3 Modul mit Trench/Feldstopp IGBT3 und Emitter Controlled 3 Diode und PressFIT / NTC  
EconoPACK™3 module with Trench/Fieldstop IGBT3 and Emitter Controlled 3 diode and PressFIT / NTC

**Vorläufige Daten / Preliminary Data** $V_{CES} = 600V$  $I_{C\ nom} = 75A / I_{CRM} = 150A$ **Typische Anwendungen**

- Solar Anwendungen

**Elektrische Eigenschaften**

- Trench IGBT 3
- Niedriges  $V_{CEsat}$

**Mechanische Eigenschaften**

- Integrierter NTC Temperatur Sensor
- Kupferbodenplatte
- PressFIT Verbindungstechnik

**Typical Applications**

- Solar Applications

**Electrical Features**

- Trench IGBT 3
- Low  $V_{CEsat}$

**Mechanical Features**

- Integrated NTC temperature sensor
- Copper Base Plate
- PressFIT Contact Technology

**Module Label Code****Barcode Code 128****DMX - 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: CM

date of publication: 2013-11-04

approved by: RS

revision: 2.2

UL approved (E83335)

Vorläufige Daten  
Preliminary Data

## IGBT, Wechselrichter / IGBT, Inverter

## Höchstzulässige Werte / Maximum Rated Values

|                                                                          |                                                              |                    |       |   |
|--------------------------------------------------------------------------|--------------------------------------------------------------|--------------------|-------|---|
| Kollektor-Emitter-Sperrspannung<br>Collector-emitter voltage             | $T_{vj} = 25^{\circ}\text{C}$                                | $V_{CES}$          | 600   | V |
| Kollektor-Dauergleichstrom<br>Continuous DC collector current            | $T_C = 80^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ | $I_{C\text{ nom}}$ | 75    | A |
| Periodischer Kollektor-Spitzenstrom<br>Repetitive peak collector current | $t_P = 1\text{ ms}$                                          | $I_{CRM}$          | 150   | A |
| Gesamt-Verlustleistung<br>Total power dissipation                        | $T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ | $P_{\text{tot}}$   | 250   | 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    | $I_C = 75\text{ A}, V_{GE} = 15\text{ V}$<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>$T_{vj} = 150^{\circ}\text{C}$                 | $V_{CE\text{ sat}}$ | 1,45<br>1,60<br>1,70    | 1,90 | V<br>V<br>V                                     |
| Gate-Schwellenspannung<br>Gate threshold voltage                                | $I_C = 1,20\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$                                                                                                                       |                                                                                                                   | $V_{GEth}$          | 4,9                     | 5,8  | 6,5 V                                           |
| Gateladung<br>Gate charge                                                       | $V_{GE} = -15\text{ V} \dots +15\text{ V}$                                                                                                                                                 |                                                                                                                   | $Q_G$               | 0,80                    |      | $\mu\text{C}$                                   |
| Interner Gatewiderstand<br>Internal gate resistor                               | $T_{vj} = 25^{\circ}\text{C}$                                                                                                                                                              |                                                                                                                   | $R_{Gint}$          | 0,0                     |      | $\Omega$                                        |
| Eingangskapazität<br>Input capacitance                                          | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$                                                                                                 |                                                                                                                   | $C_{ies}$           | 4,60                    |      | nF                                              |
| Rückwirkungskapazität<br>Reverse transfer capacitance                           | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$                                                                                                 |                                                                                                                   | $C_{res}$           | 0,145                   |      | nF                                              |
| Kollektor-Emitter-Reststrom<br>Collector-emitter cut-off current                | $V_{CE} = 600\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$                                                                                                                  |                                                                                                                   | $I_{CES}$           |                         | 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 | $I_C = 75\text{ A}, V_{CE} = 300\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 5,1\ \Omega$                                                                                        | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$                 | $t_{d\text{ on}}$   | 0,025<br>0,025<br>0,025 |      | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| Anstiegszeit, induktive Last<br>Rise time, inductive load                       | $I_C = 75\text{ A}, V_{CE} = 300\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Gon} = 5,1\ \Omega$                                                                                        | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$                 | $t_r$               | 0,02<br>0,02<br>0,02    |      | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| Abschaltverzögerungszeit, induktive Last<br>Turn-off delay time, inductive load | $I_C = 75\text{ A}, V_{CE} = 300\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 5,1\ \Omega$                                                                                       | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$                 | $t_{d\text{ off}}$  | 0,21<br>0,24<br>0,25    |      | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| Fallzeit, induktive Last<br>Fall time, inductive load                           | $I_C = 75\text{ A}, V_{CE} = 300\text{ V}$<br>$V_{GE} = \pm 15\text{ V}$<br>$R_{Goff} = 5,1\ \Omega$                                                                                       | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$                 | $t_f$               | 0,06<br>0,07<br>0,07    |      | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| Einschaltverlustenergie pro Puls<br>Turn-on energy loss per pulse               | $I_C = 75\text{ A}, V_{CE} = 300\text{ V}, L_S = 30\text{ nH}$<br>$V_{GE} = \pm 15\text{ V}, di/dt = 4000\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$<br>$R_{Gon} = 5,1\ \Omega$  | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$                 | $E_{on}$            | 0,35<br>0,50<br>0,60    |      | mJ<br>mJ<br>mJ                                  |
| Abschaltverlustenergie pro Puls<br>Turn-off energy loss per pulse               | $I_C = 75\text{ A}, V_{CE} = 300\text{ V}, L_S = 30\text{ nH}$<br>$V_{GE} = \pm 15\text{ V}, du/dt = 4000\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$<br>$R_{Goff} = 5,1\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$                 | $E_{off}$           | 2,40<br>2,80<br>3,00    |      | mJ<br>mJ<br>mJ                                  |
| Kurzschlußverhalten<br>SC data                                                  | $V_{GE} \leq 15\text{ V}, V_{CC} = 360\text{ V}$<br>$V_{CE\text{ max}} = V_{CES} - L_{SCE} \cdot di/dt$                                                                                    | $t_P \leq 8\ \mu\text{s}, T_{vj} = 25^{\circ}\text{C}$<br>$t_P \leq 6\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$ | $I_{SC}$            | 530<br>380              |      | A<br>A                                          |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case       | pro IGBT / per IGBT                                                                                                                                                                        |                                                                                                                   | $R_{thJC}$          |                         | 0,60 | K/W                                             |
| Wärmewiderstand, Gehäuse bis Kühlkörper<br>Thermal resistance, case to heatsink | pro IGBT / per IGBT<br>$\lambda_{\text{Paste}} = 1\text{ W}/(\text{m} \cdot \text{K}) / \lambda_{\text{grease}} = 1\text{ W}/(\text{m} \cdot \text{K})$                                    |                                                                                                                   | $R_{thCH}$          | 0,21                    |      | K/W                                             |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions           |                                                                                                                                                                                            |                                                                                                                   | $T_{vj\text{ op}}$  | -40                     | 150  | $^{\circ}\text{C}$                              |

prepared by: CM

date of publication: 2013-11-04

approved by: RS

revision: 2.2

Vorläufige Daten  
Preliminary Data

## Diode, Wechselrichter / Diode, Inverter

## Höchstzulässige Werte / Maximum Rated Values

|                                                                     |                                                                                                                                              |           |            |                                              |
|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------|----------------------------------------------|
| Periodische Spitzensperrspannung<br>Repetitive peak reverse voltage | $T_{vj} = 25^{\circ}\text{C}$                                                                                                                | $V_{RRM}$ | 600        | 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>$V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | $I^2t$    | 660<br>610 | $\text{A}^2\text{s}$<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>$T_{vj} = 150^{\circ}\text{C}$ | $V_F$              |      | 1,55<br>1,50<br>1,45 | 1,95 | V<br>V<br>V                                     |
| Rückstromspitze<br>Peak reverse recovery current                                | $I_F = 75\text{ A}, -di_F/dt = 4000\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 300\text{ V}$<br>$V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $I_{RM}$           |      | 100<br>115<br>125    |      | A<br>A<br>A                                     |
| Sperrverzögerungsladung<br>Recovered charge                                     | $I_F = 75\text{ A}, -di_F/dt = 4000\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 300\text{ V}$<br>$V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $Q_r$              |      | 3,00<br>6,00<br>7,50 |      | $\mu\text{C}$<br>$\mu\text{C}$<br>$\mu\text{C}$ |
| Abschaltenergie pro Puls<br>Reverse recovery energy                             | $I_F = 75\text{ A}, -di_F/dt = 4000\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$<br>$V_R = 300\text{ V}$<br>$V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$<br>$T_{vj} = 150^{\circ}\text{C}$ | $E_{rec}$          |      | 0,95<br>1,50<br>1,85 |      | mJ<br>mJ<br>mJ                                  |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case       | pro Diode / per diode                                                                                                                     |                                                                                                   | $R_{thJC}$         |      |                      | 0,95 | K/W                                             |
| Wärmewiderstand, Gehäuse bis Kühlkörper<br>Thermal resistance, case to heatsink | pro Diode / per diode<br>$\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$ |                                                                                                   | $R_{thCH}$         |      | 0,33                 |      | K/W                                             |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions           |                                                                                                                                           |                                                                                                   | $T_{vj\text{ op}}$ | -40  |                      | 150  | $^{\circ}\text{C}$                              |

Vorläufige Daten  
Preliminary Data**MOSFET / MOSFET****Höchstzulässige Werte / Maximum Rated Values**

|                                                                                                |                                                          |                             |  |          |  |        |
|------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------|--|----------|--|--------|
| Drain-Source-Sperrspannung<br>Drain-source breakdown voltage                                   | $T_{vj} = 25^{\circ}\text{C}$                            | $V_{DSS}$                   |  | 600      |  | V      |
| Drain-Gleichstrom<br>DC drain current                                                          | $T_C = 80^{\circ}\text{C}$<br>$T_C = 25^{\circ}\text{C}$ | $I_{D\text{ nom}}$<br>$I_D$ |  | 70<br>80 |  | A<br>A |
| Gepulster Drainstrom, tp limitiert durch<br>Tjmax<br>Pulsed drain current, tp limited by Tjmax |                                                          | $I_{D\text{ puls}}$         |  | 210      |  | A      |
| Gesamt-Verlustleistung<br>Total power dissipation                                              | $T_C = 25^{\circ}\text{C}$                               | $P_{\text{tot}}$            |  | 1200     |  | W      |
| Gate-Source-Spitzenspannung<br>Gate-source peak voltage                                        |                                                          | $V_{GSS}$                   |  | +/-20    |  | V      |

**Charakteristische Werte / Characteristic Values**

|                                                                                 |                                                                                                                                                                                                   |                    | min. | typ.           | max. |     |
|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------|----------------|------|-----|
| Einschaltwiderstand<br>Drain-source on resistance                               | $I_D = 70\text{ A}$ , $V_{GS} = 10\text{ V}$ , $T_{vj} = 25^{\circ}\text{C}$                                                                                                                      | $R_{DS\text{ on}}$ |      | 22,0           |      | mΩ  |
| Gate-Schwellenspannung<br>Gate threshold voltage                                | $I_D = 9,00\text{ mA}$ , $V_{DS} = V_{GS}$ , $T_{vj} = 25^{\circ}\text{C}$                                                                                                                        | $V_{GS(th)}$       | 3,00 | 4,00           | 5,00 | V   |
| Gateladung<br>Gate charge                                                       | $V_{GS} = 10\text{ V}$ , $V_{DD} = 480\text{ V}$                                                                                                                                                  | $Q_G$              |      | 0,25           |      | μC  |
| Interner Gatewiderstand<br>Internal gate resistor                               | $T_{vj} = 25^{\circ}\text{C}$                                                                                                                                                                     | $R_{Gint}$         |      | 1,3            |      | Ω   |
| Eingangskapazität<br>Input capacitance                                          | $f = 1\text{ MHz}$ , $T_{vj} = 25^{\circ}\text{C}$ , $V_{DS} = 25\text{ V}$ , $V_{GS} = 0\text{ V}$                                                                                               | $C_{iss}$          |      | 23,0           |      | nF  |
| Ausgangskapazität<br>Output capacitance                                         | $f = 1\text{ MHz}$ , $T_{vj} = 25^{\circ}\text{C}$ , $V_{DS} = 25\text{ V}$ , $V_{GS} = 0\text{ V}$                                                                                               | $C_{oss}$          |      | 6,60           |      | nF  |
| Rückwirkungskapazität<br>Reverse transfer capacitance                           | $f = 1\text{ MHz}$ , $T_{vj} = 25^{\circ}\text{C}$ , $V_{DS} = 25\text{ V}$ , $V_{GS} = 0\text{ V}$                                                                                               | $C_{rss}$          |      | 0,23           |      | nF  |
| Drain-Source-Reststrom<br>Zero gate voltage drain current                       | $V_{DS} = 600\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_{vj} = 25^{\circ}\text{C}$                                                                                                                   | $I_{DSS}$          |      |                | 100  | μA  |
| Gate-Source-Reststrom<br>Gate-source leakage current                            | $V_{DS} = 0\text{ V}$ , $V_{GS} = 20\text{ V}$ , $T_{vj} = 25^{\circ}\text{C}$                                                                                                                    | $I_{GSS}$          |      |                | 0,10 | nA  |
| Einschaltverzögerungszeit, induktive Last<br>Turn on delay time, inductive load | $I_D = 70\text{ A}$ , $V_{DS} = 400\text{ V}$<br>$V_{GS} = 10\text{ V}$<br>$R_G = 10,0\text{ Ω}$<br>$T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$                               | $t_{d\text{ on}}$  |      | 0,18<br>0,17   |      | ns  |
| Anstiegszeit, induktive Last<br>Rise time, inductive load                       | $I_D = 70\text{ A}$ , $V_{DS} = 400\text{ V}$<br>$V_{GS} = 10\text{ V}$<br>$R_G = 10,0\text{ Ω}$<br>$T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$                               | $t_r$              |      | 0,075<br>0,075 |      | ns  |
| Abschaltverzögerungszeit, induktive Last<br>Turn off delay time, inductive load | $I_D = 70\text{ A}$ , $V_{DS} = 400\text{ V}$<br>$V_{GS} = 10\text{ V}$<br>$R_G = 10,0\text{ Ω}$<br>$T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$                               | $t_{d\text{ off}}$ |      | 0,50<br>0,53   |      | ns  |
| Fallzeit, induktive Last<br>Fall time, inductive load                           | $I_D = 70\text{ A}$ , $V_{DS} = 400\text{ V}$<br>$V_{GS} = 10\text{ V}$<br>$R_G = 10,0\text{ Ω}$<br>$T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$                               | $t_f$              |      | 0,03<br>0,035  |      | ns  |
| Einschaltverlustenergie pro Puls<br>Turn-on energy loss per pulse               | $I_D = 70\text{ A}$ , $V_{DS} = 400\text{ V}$ , $L_{\sigma} = 30\text{ nH}$<br>$V_{GS} = 10\text{ V}$<br>$R_G = 10,0\text{ Ω}$<br>$T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$ | $E_{\text{on}}$    |      | 1,90           |      | mJ  |
| Abschaltverlustenergie pro Puls<br>Turn-off energy loss per pulse               | $I_D = 70\text{ A}$ , $V_{DS} = 400\text{ V}$ , $L_{\sigma} = 30\text{ nH}$<br>$V_{GS} = 10\text{ V}$<br>$R_G = 10,0\text{ Ω}$<br>$T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$ | $E_{\text{off}}$   |      | 1,05           |      | mJ  |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case       |                                                                                                                                                                                                   | $R_{thJC}$         |      |                | 0,12 | K/W |
| Wärmewiderstand, Gehäuse bis Kühlkörper<br>Thermal resistance, case to heatsink | pro MOS-FET / per MOS-FET<br>$\lambda_{\text{Paste}} = 1\text{ W/(m}^2\text{K)}$ / $\lambda_{\text{grease}} = 1\text{ W/(m}^2\text{K)}$                                                           | $R_{thCH}$         |      | 0,042          |      | K/W |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions           |                                                                                                                                                                                                   | $T_{vj\text{ op}}$ | -40  |                | 125  | °C  |

**Revers-Diode / reverse-diode**

|                                      |                                                                                                                                                               |          | min. | typ.         | max. |   |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------|--------------|------|---|
| Durchlassspannung<br>Forward voltage | $I_S = 70\text{ A}$ , $V_{GS} = 0\text{ V}$<br>$I_S = 70\text{ A}$ , $V_{GS} = 0\text{ V}$<br>$T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$ | $V_{SD}$ |      | 0,80<br>0,70 | 1,10 | V |

prepared by: CM

date of publication: 2013-11-04

approved by: RS

revision: 2.2

Vorläufige Daten  
Preliminary Data

## MOSFET OVP-Zweig / MOSFET OVP-Path

## Höchstzulässige Werte / Maximum Rated Values

|                                                                                                |                                                          |                             |  |          |  |        |
|------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------|--|----------|--|--------|
| Drain-Source-Sperrspannung<br>Drain-source breakdown voltage                                   | $T_{vj} = 25^{\circ}\text{C}$                            | $V_{DSS}$                   |  | 600      |  | V      |
| Drain-Gleichstrom<br>DC drain current                                                          | $T_C = 80^{\circ}\text{C}$<br>$T_C = 25^{\circ}\text{C}$ | $I_{D\text{ nom}}$<br>$I_D$ |  | 70<br>80 |  | A<br>A |
| Gepulster Drainstrom, tp limitiert durch<br>Tjmax<br>Pulsed drain current, tp limited by Tjmax |                                                          | $I_{D\text{ puls}}$         |  | 210      |  | A      |
| Gesamt-Verlustleistung<br>Total power dissipation                                              | $T_C = 25^{\circ}\text{C}$                               | $P_{\text{tot}}$            |  | 1200     |  | W      |
| Gate-Source-Spitzenspannung<br>Gate-source peak voltage                                        |                                                          | $V_{GSS}$                   |  | +/-20    |  | V      |

## Charakteristische Werte / Characteristic Values

|                                                                                 |                                                                                                                                       |                                                                 | min.               | typ.          | max. |     |
|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|--------------------|---------------|------|-----|
| Einschaltwiderstand<br>Drain-source on resistance                               | $I_D = 70\text{ A}, V_{GS} = 10\text{ V}, T_{vj} = 25^{\circ}\text{C}$                                                                | $R_{DS\text{ on}}$                                              |                    | 12,5          |      | mΩ  |
| Gate-Schwellenspannung<br>Gate threshold voltage                                | $I_D = 9,00\text{ mA}, V_{DS} = V_{GS}, T_{vj} = 25^{\circ}\text{C}$                                                                  | $V_{GS(th)}$                                                    | 2,50               | 3,00          | 3,50 | V   |
| Gateladung<br>Gate charge                                                       | $V_{GS} = 10\text{ V}, V_{DD} = 400\text{ V}$                                                                                         | $Q_G$                                                           |                    | 0,45          |      | μC  |
| Interner Gatewiderstand<br>Internal gate resistor                               | $T_{vj} = 25^{\circ}\text{C}$                                                                                                         | $R_{Gint}$                                                      |                    | 1,3           |      | Ω   |
| Eingangskapazität<br>Input capacitance                                          | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}$                                            | $C_{iss}$                                                       |                    | 21,0          |      | nF  |
| Ausgangskapazität<br>Output capacitance                                         | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}$                                            | $C_{oss}$                                                       |                    | 45,0          |      | nF  |
| Rückwirkungskapazität<br>Reverse transfer capacitance                           | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}$                                            | $C_{rss}$                                                       |                    | 0,90          |      | nF  |
| Drain-Source-Reststrom<br>Zero gate voltage drain current                       | $V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$                                                             | $I_{DSS}$                                                       |                    |               | 100  | μA  |
| Gate-Source-Reststrom<br>Gate-source leakage current                            | $V_{DS} = 0\text{ V}, V_{GS} = 20\text{ V}, T_{vj} = 25^{\circ}\text{C}$                                                              | $I_{GSS}$                                                       |                    |               | 0,10 | nA  |
| Einschaltverzögerungszeit, induktive Last<br>Turn on delay time, inductive load | $I_D = 70\text{ A}, V_{DS} = 400\text{ V}$<br>$R_G = 10,0\text{ }\Omega$                                                              | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$ | $t_{d\text{ on}}$  | 0,03<br>0,035 |      | ns  |
| Anstiegszeit, induktive Last<br>Rise time, inductive load                       | $I_D = 70\text{ A}, V_{DS} = 400\text{ V}$<br>$R_G = 10,0\text{ }\Omega$                                                              | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$ | $t_r$              | 0,02<br>0,02  |      | ns  |
| Abschaltverzögerungszeit, induktive Last<br>Turn off delay time, inductive load | $I_D = 70\text{ A}, V_{DS} = 400\text{ V}$<br>$R_G = 10,0\text{ }\Omega$                                                              | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$ | $t_{d\text{ off}}$ | 0,10<br>0,11  |      | ns  |
| Fallzeit, induktive Last<br>Fall time, inductive load                           | $I_D = 70\text{ A}, V_{DS} = 400\text{ V}$<br>$R_G = 10,0\text{ }\Omega$                                                              | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$ | $t_f$              | 0,01<br>0,015 |      | ns  |
| Einschaltverlustenergie pro Puls<br>Turn-on energy loss per pulse               | $I_D = 70\text{ A}, V_{DS} = 400\text{ V}, L_{\sigma} = 30\text{ nH}$<br>$R_G = 10,0\text{ }\Omega$                                   | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$ | $E_{on}$           | 1,20          |      | mJ  |
| Abschaltverlustenergie pro Puls<br>Turn-off energy loss per pulse               | $I_D = 70\text{ A}, V_{DS} = 400\text{ V}, L_{\sigma} = 30\text{ nH}$<br>$R_G = 10,0\text{ }\Omega$                                   | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$ | $E_{off}$          | 0,80          |      | mJ  |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case       |                                                                                                                                       | $R_{thJC}$                                                      |                    |               | 0,12 | K/W |
| Wärmewiderstand, Gehäuse bis Kühlkörper<br>Thermal resistance, case to heatsink | pro MOS-FET / per MOS-FET<br>$\lambda_{\text{Paste}} = 1\text{ W/(m}^2\text{K)} / \lambda_{\text{grease}} = 1\text{ W/(m}^2\text{K)}$ | $R_{thCH}$                                                      |                    | 0,042         |      | K/W |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions           |                                                                                                                                       | $T_{vj\text{ op}}$                                              | -40                |               | 125  | °C  |

## Revers-Diode / reverse-diode

|                                      |                                                                                      |                                                                 | min.     | typ.         | max. |   |
|--------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------|----------|--------------|------|---|
| Durchlassspannung<br>Forward voltage | $I_S = 70\text{ A}, V_{GS} = 0\text{ V}$<br>$I_S = 70\text{ A}, V_{GS} = 0\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$<br>$T_{vj} = 125^{\circ}\text{C}$ | $V_{SD}$ | 0,90<br>1,10 | 1,20 | V |

prepared by: CM

date of publication: 2013-11-04

approved by: RS

revision: 2.2

Vorläufige Daten  
Preliminary Data

## 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.

## Modul / Module

|                                                                                 |                                                                                                                                                          |                     |            |                         |            |                                      |
|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------|-------------------------|------------|--------------------------------------|
| Isolations-Prüfspannung<br>Isolation test voltage                               | RMS, f = 50 Hz, t = 1 min.                                                                                                                               | $V_{\text{ISOL}}$   |            | 2,5                     |            | kV                                   |
| Material Modulgrundplatte<br>Material of module baseplate                       |                                                                                                                                                          |                     |            | Cu                      |            |                                      |
| Innere Isolation<br>Internal isolation                                          | Basisisolation (Schutzklasse 1, EN61140)<br>basic insulation (class 1, IEC 61140)                                                                        |                     |            | $\text{Al}_2\text{O}_3$ |            |                                      |
| 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>$\lambda_{\text{Paste}} = 1 \text{ W}/(\text{m}\cdot\text{K}) / \lambda_{\text{grease}} = 1 \text{ W}/(\text{m}\cdot\text{K})$ | $R_{\text{thCH}}$   |            | 0,009                   |            | K/W                                  |
| Modulstreuinduktivität<br>Stray inductance module                               |                                                                                                                                                          | $L_{\text{sCE}}$    |            | 30                      |            | nH                                   |
| Höchstzulässige Sperrschichttemperatur<br>Maximum junction temperature          | Wechselrichter, Brems-Chopper / inverter, brake-chopper<br>MOSFET                                                                                        | $T_{\text{vj max}}$ |            |                         | 175<br>150 | $^\circ\text{C}$<br>$^\circ\text{C}$ |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions           | Wechselrichter, Brems-Chopper / inverter, brake-chopper<br>MOSFET                                                                                        | $T_{\text{vj op}}$  | -40<br>-40 |                         | 150<br>125 | $^\circ\text{C}$<br>$^\circ\text{C}$ |
| Lagertemperatur<br>Storage temperature                                          |                                                                                                                                                          | $T_{\text{stg}}$    | -40        |                         | 125        | $^\circ\text{C}$                     |
| 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                   |            | 300                     |            | g                                    |

NTC-Widerstand/NTC-thermistor: KG3B-35-5E3Z

prepared by: CM

date of publication: 2013-11-04

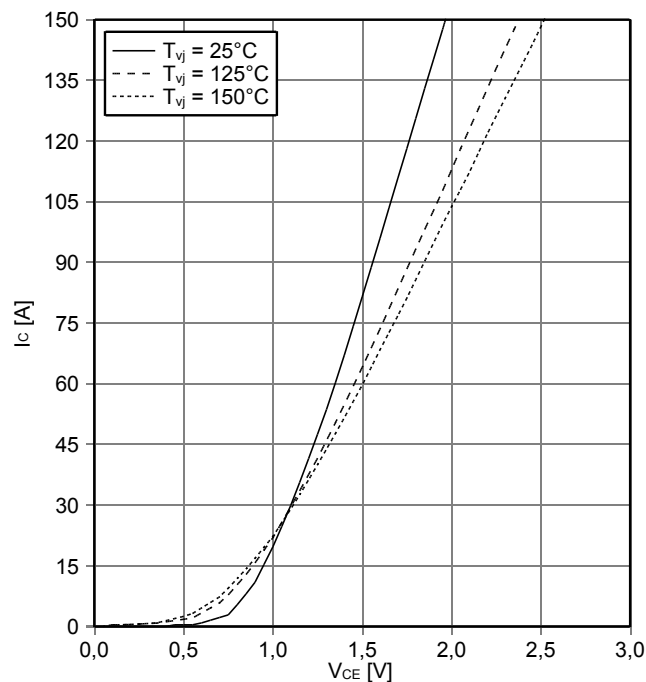
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revision: 2.2

# Vorläufige Daten Preliminary Data

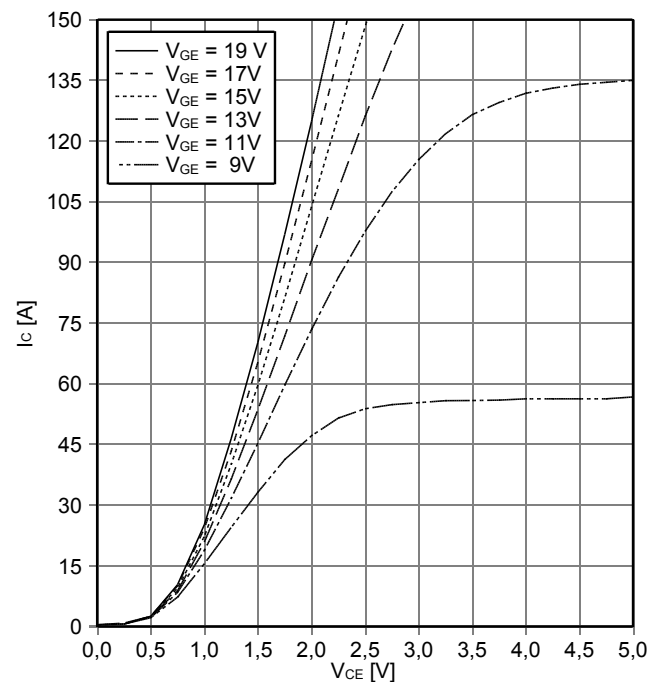
**Ausgangskennlinie IGBT, Wechselrichter (typisch)**  
**output characteristic IGBT, Inverter (typical)**

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



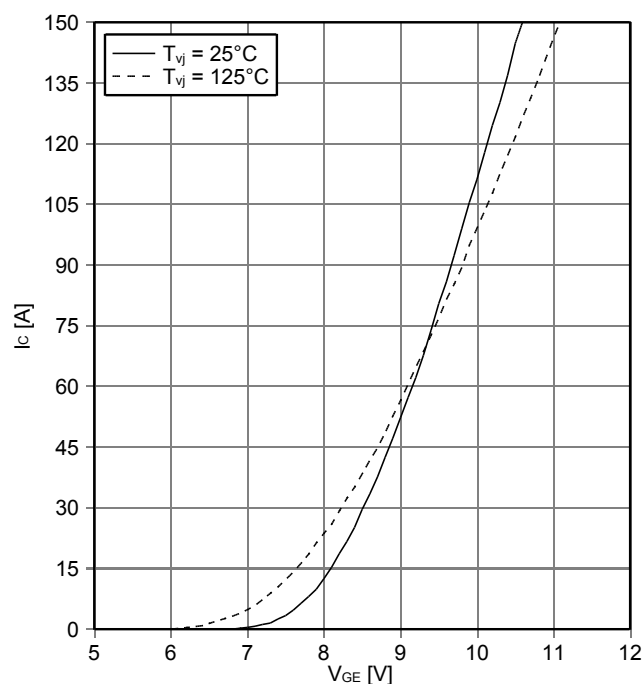
**Ausgangskennlinienfeld IGBT, Wechselrichter (typisch)**  
**output characteristic IGBT, Inverter (typical)**

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



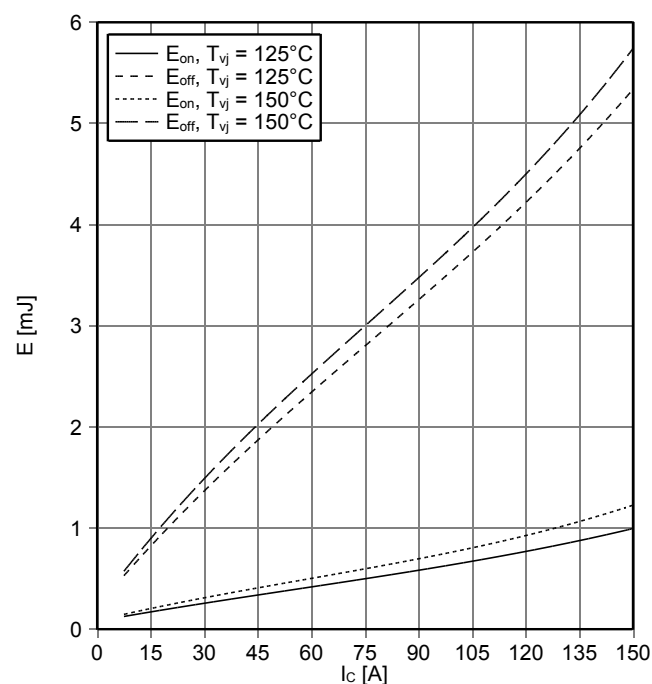
**Übertragungscharakteristik IGBT, Wechselrichter (typisch)**  
**transfer characteristic IGBT, Inverter (typical)**

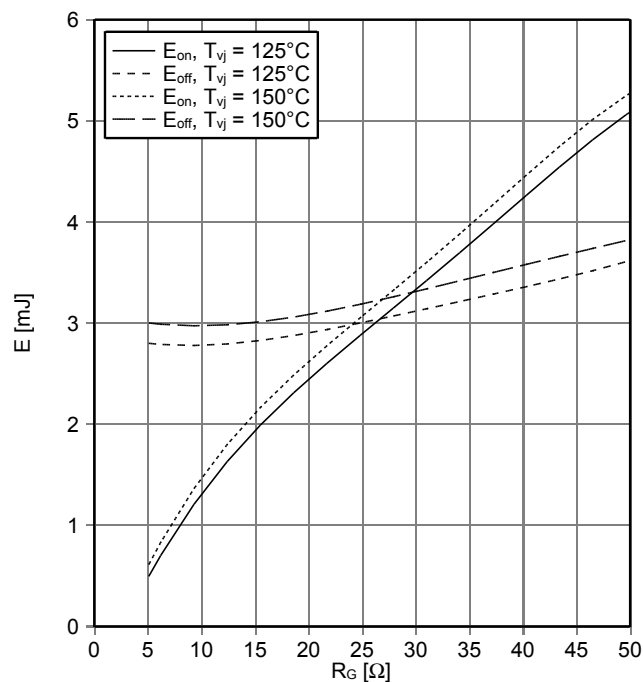
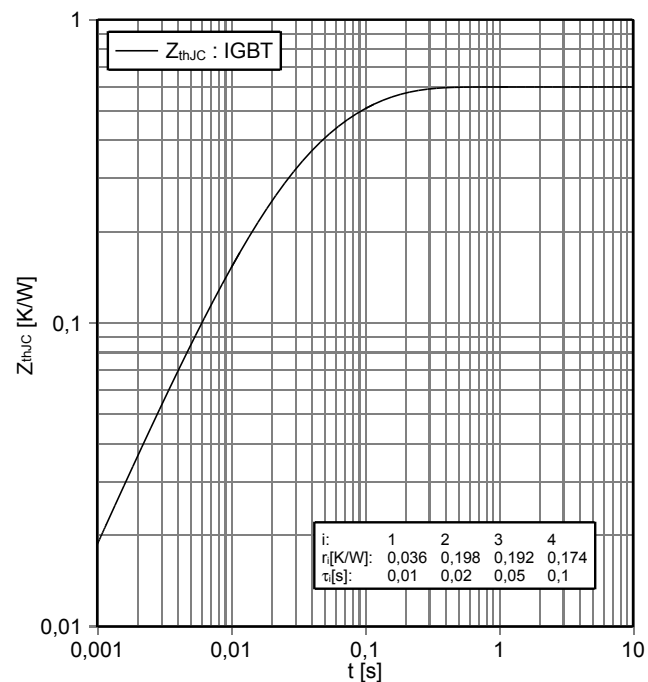
$I_C = f(V_{GE})$   
 $V_{CE} = 20\text{ V}$



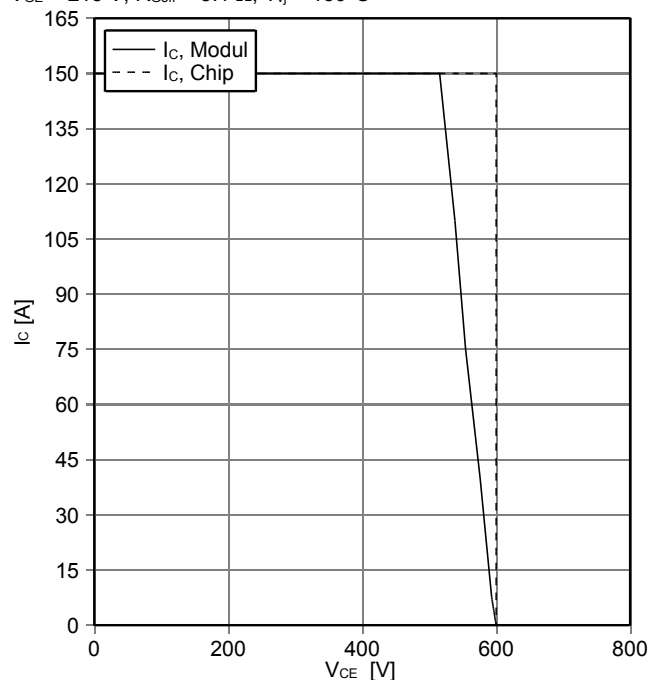
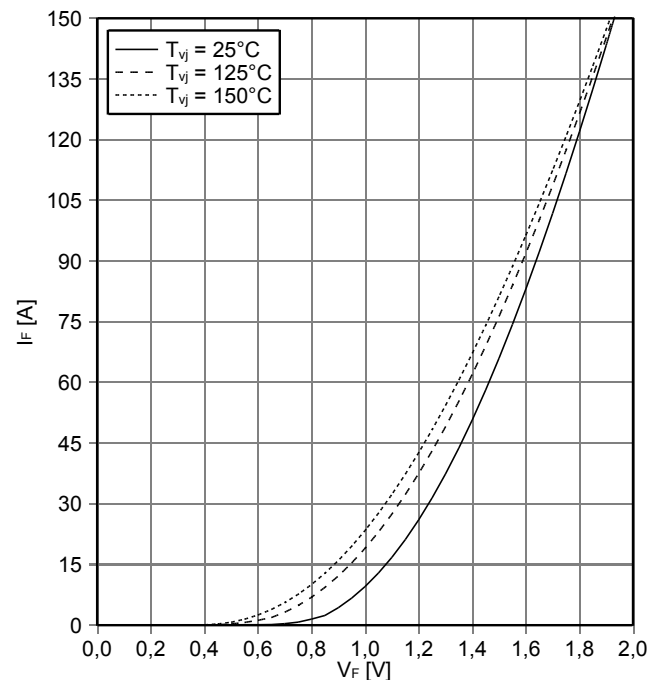
**Schaltverluste IGBT, Wechselrichter (typisch)**  
**switching losses IGBT, Inverter (typical)**

$E_{on} = f(I_C)$ ,  $E_{off} = f(I_C)$   
 $V_{GE} = \pm 15\text{ V}$ ,  $R_{Gon} = 5.1\ \Omega$ ,  $R_{Goff} = 5.1\ \Omega$ ,  $V_{CE} = 300\text{ V}$



Vorläufige Daten  
Preliminary DataSchaltverluste IGBT, Wechselrichter (typisch)  
switching losses IGBT, Inverter (typical) $E_{on} = f(R_G)$ ,  $E_{off} = f(R_G)$  $V_{GE} = \pm 15\text{ V}$ ,  $I_C = 75\text{ A}$ ,  $V_{CE} = 300\text{ V}$ 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)

 $I_C = f(V_{CE})$  $V_{GE} = \pm 15\text{ V}$ ,  $R_{Goff} = 5.1\ \Omega$ ,  $T_{vj} = 150^\circ\text{C}$ Durchlasskennlinie der Diode, Wechselrichter (typisch)  
forward characteristic of Diode, Inverter (typical) $I_F = f(V_F)$ 

prepared by: CM

date of publication: 2013-11-04

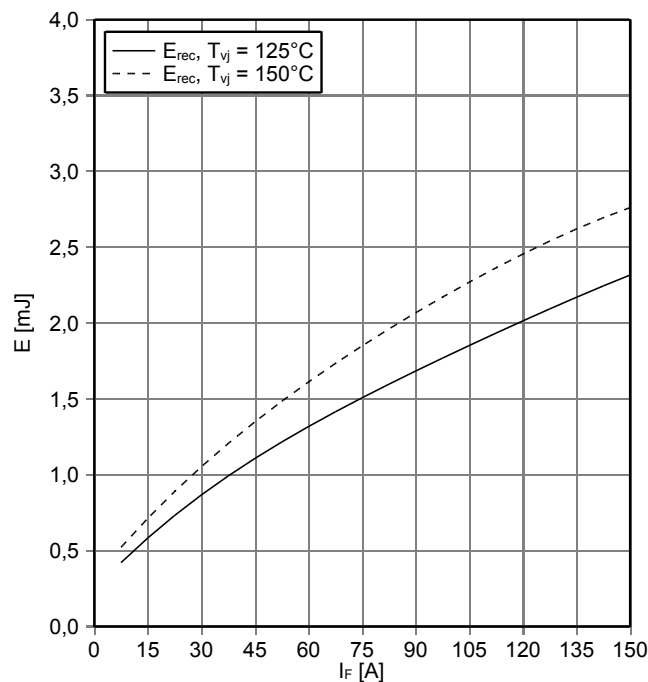
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Vorläufige Daten  
Preliminary Data

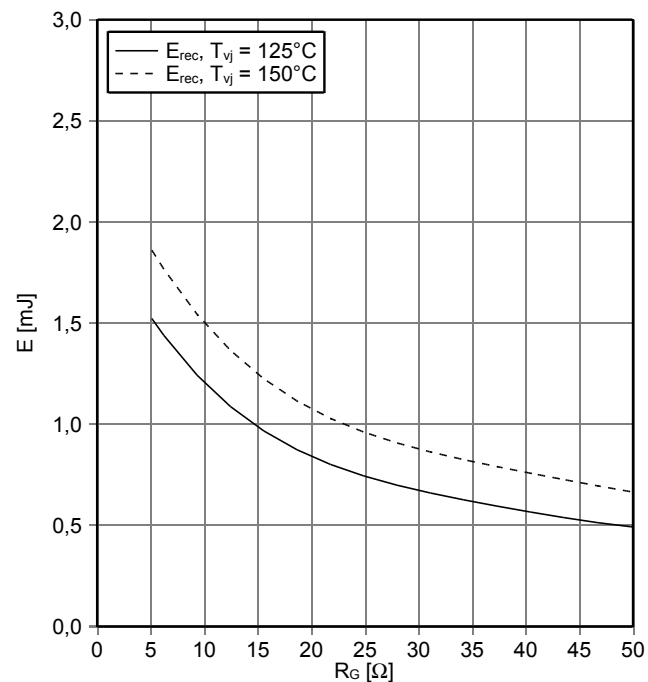
Schaltverluste Diode, Wechselrichter (typisch)  
switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$   
 $R_{Gon} = 5.1 \Omega$ ,  $V_{CE} = 300 V$



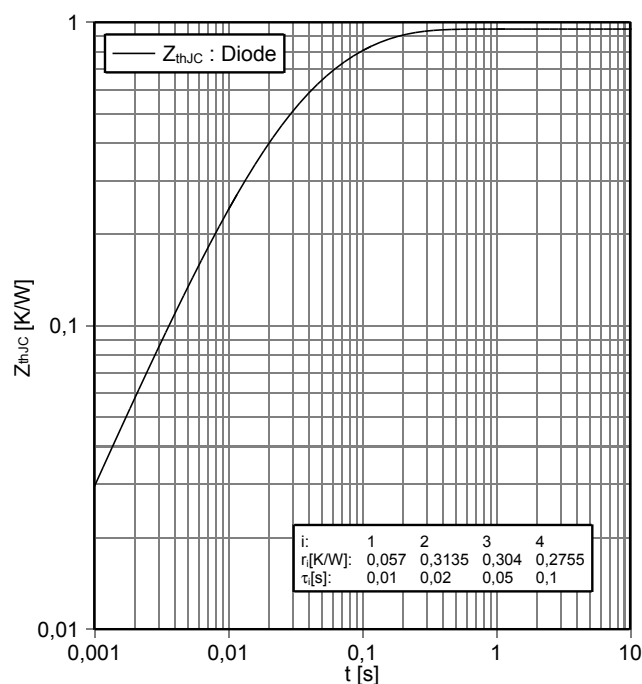
Schaltverluste Diode, Wechselrichter (typisch)  
switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$   
 $I_F = 75 A$ ,  $V_{CE} = 300 V$



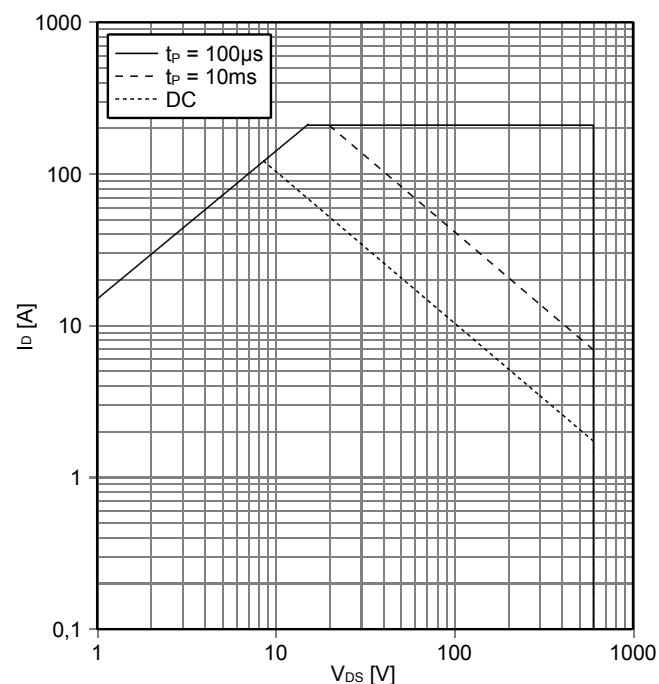
Transienter Wärmewiderstand Diode, Wechselrichter  
transient thermal impedance Diode, Inverter

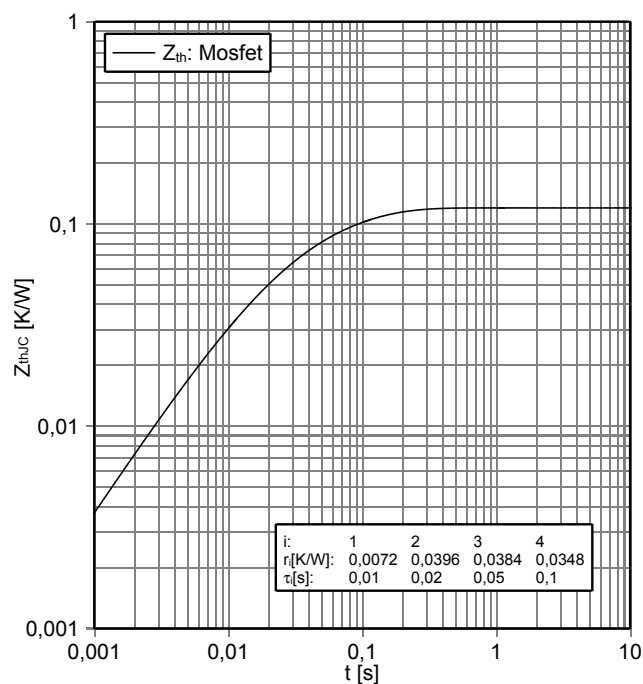
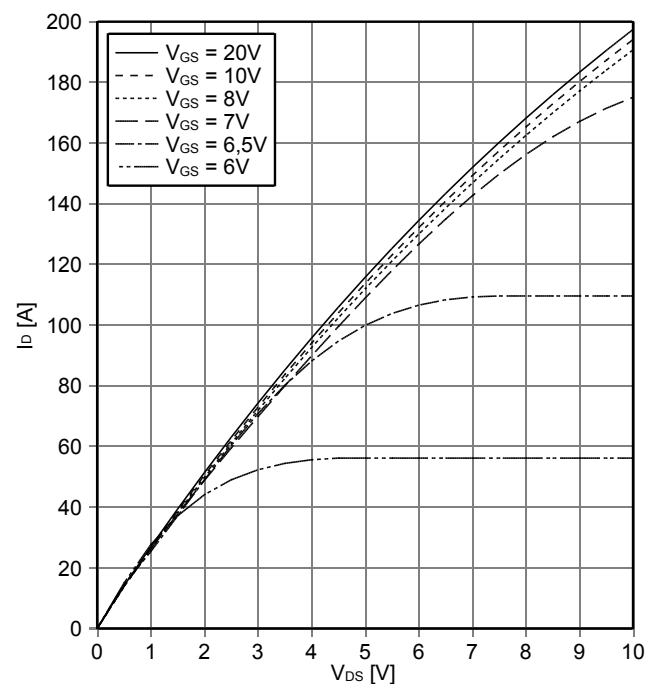
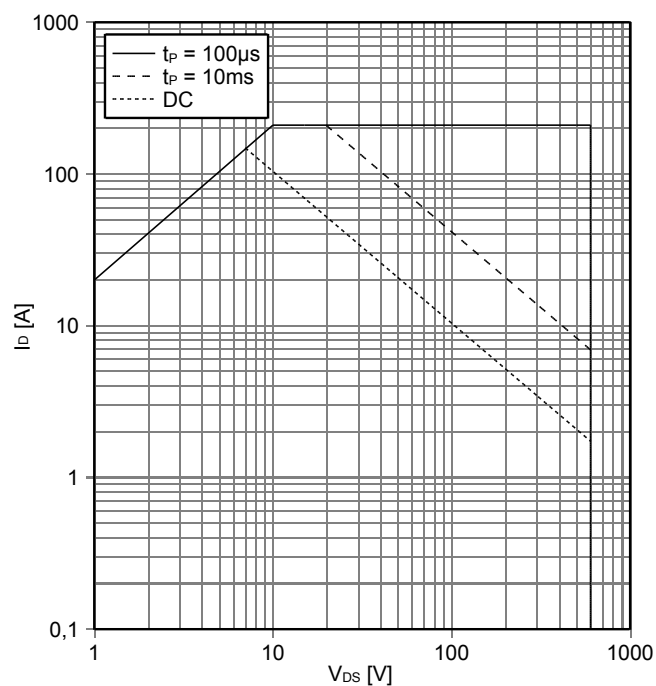
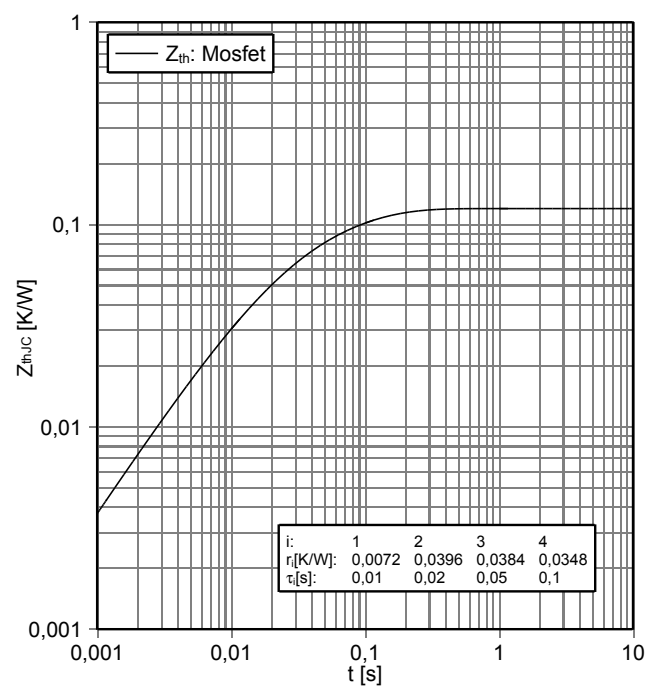
$Z_{thJC} = f(t)$



Sicherer Arbeitsbereich MOSFET (SOA)  
safe operating area MOSFET (SOA)

$I_D = f(V_{DS})$   
 $V_{GS} = \pm 15 V$ ,  $T_c = 25^\circ C$



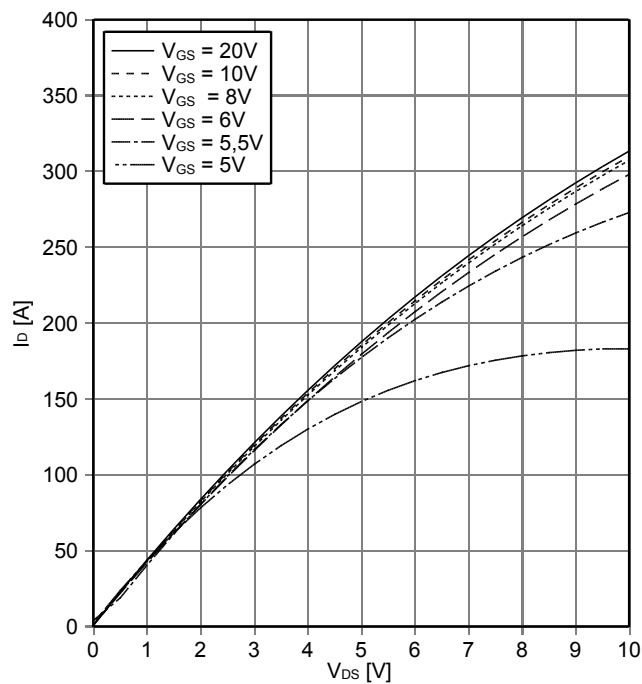
Vorläufige Daten  
Preliminary DataTransienter Wärmewiderstand MOSFET  
transient thermal impedance MOSFET $Z_{thJC} = f(t)$ Ausgangskennlinie MOSFET (typisch)  
output characteristic MOSFET (typical) $I_D = f(V_{DS})$  $T_{vj} = 125^\circ\text{C}$ Sicherer Arbeitsbereich MOSFET OVP-Zweig (SOA)  
safe operating area MOSFET OVP-Path (SOA) $I_D = f(V_{DS})$  $V_{GS} = \pm 15\text{ V}$ ,  $T_c = 25^\circ\text{C}$ Transienter Wärmewiderstand MOSFET OVP-Zweig  
transient thermal impedance MOSFET OVP-Path $Z_{thJC} = f(t)$ 

prepared by: CM

date of publication: 2013-11-04

approved by: RS

revision: 2.2

**Vorläufige Daten**  
**Preliminary Data****Ausgangskennlinie MOSFET OVP-Zweig (typisch)**  
**output characteristic MOSFET OVP-Path (typical)** $I_D = f(V_{DS})$   
 $T_{vj} = 125^\circ\text{C}$ 

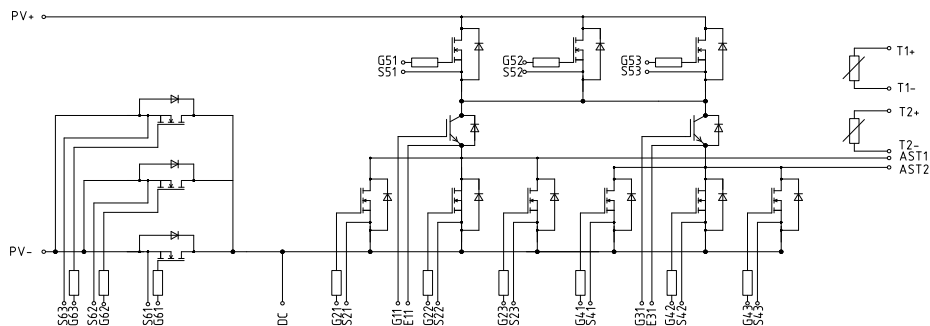
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date of publication: 2013-11-04

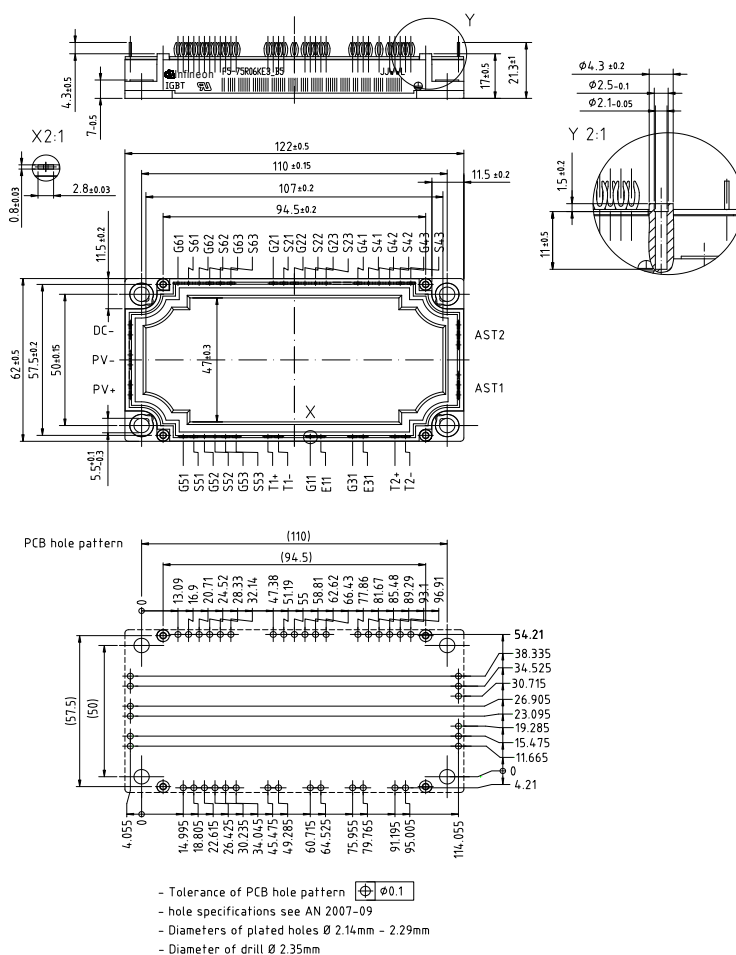
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revision: 2.2

Schaltplan / circuit\_diagram\_headline



Gehäuseabmessungen / package outlines



## Vorläufige Daten Preliminary Data

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