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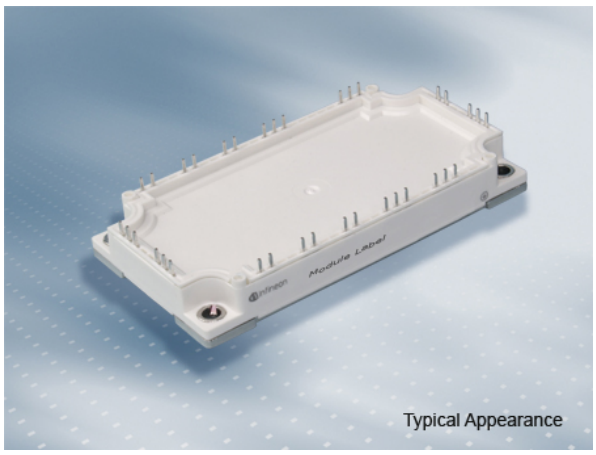
# Technische Information / Technical Information

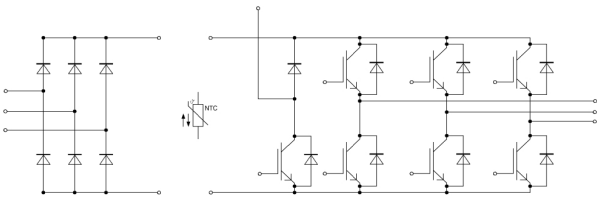
IGBT-Module
IGBT-modules

# FP150R07N3E4

EconoPIM™3 Modul mit Trench/Feldstopp IGBT4 und Emitter Controlled Diode und NTC
EconoPIM™3 module with trench/fieldstop IGBT4 and Emitter Controlled Diode and NTC

**Vorläufige Daten / Preliminary Data**



$V_{CES}$ = 650V
$I_{C\ nom}$ = 150A / $I_{CRM}$ = 300A

## Typische Anwendungen
- Motorantriebe

## Typical Applications
- Motor Drives

## Elektrische Eigenschaften
- Erhöhte Sperrspannungsfestigkeit auf 650V
- Hohe Kurzschlussrobustheit, selbstlimitierender Kurzschlussstrom
- Trench IGBT 4
- $T_{vj\ op}$ = 150°C
- $V_{CEsat}$ mit positivem Temperaturkoeffizienten

## Electrical Features
- Increased blocking voltage capability to 650V
- High Short Circuit Capability, Self Limiting Short Circuit Current
- Trench IGBT 4
- $T_{vj\ op}$ = 150°C
- $V_{CEsat}$ with positive Temperature Coefficient

## Mechanische Eigenschaften
- Integrierter NTC Temperatur Sensor
- Kupferbodenplatte
- Lötverbindungstechnik
- Standardgehäuse

## Mechanical Features
- Integrated NTC temperature sensor
- Copper Base Plate
- Solder Contact Technology
- Standard Housing

## 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: AS | date of publication: 2013-11-05 | |
| 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°C | $V_{CES}$ | 650 | V |
| Kollektor-Dauergleichstrom<br>Continuous DC collector current | $T_C$ = 55°C, $T_{vj\,max}$ = 175°C | $I_{C\,nom}$ | 150 | A |
| Periodischer Kollektor-Spitzenstrom<br>Repetitive peak collector current | $t_P$ = 1 ms | $I_{CRM}$ | 300 | A |
| Gesamt-Verlustleistung<br>Total power dissipation | $T_C$ = 25°C, $T_{vj\,max}$ = 175°C | $P_{tot}$ | 430 | 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 | $I_C$ = 150 A, $V_{GE}$ = 15 V<br>$I_C$ = 150 A, $V_{GE}$ = 15 V<br>$I_C$ = 150 A, $V_{GE}$ = 15 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $V_{CE\,sat}$ | | 1,55<br>1,70<br>1,75 | 1,95 | V<br>V<br>V |
| Gate-Schwellenspannung<br>Gate threshold voltage | $I_C$ = 2,40 mA, $V_{CE}$ = $V_{GE}$, $T_{vj}$ = 25°C | | $V_{GEth}$ | 5,0 | 5,8 | 6,5 | V |
| Gateladung<br>Gate charge | $V_{GE}$ = -15 V ... +15 V | | $Q_G$ | | 1,50 | | µC |
| Interner Gatewiderstand<br>Internal gate resistor | $T_{vj}$ = 25°C | | $R_{Gint}$ | | 2,0 | | Ω |
| Eingangskapazität<br>Input capacitance | f = 1 MHz, $T_{vj}$ = 25°C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | $C_{ies}$ | | 9,30 | | nF |
| Rückwirkungskapazität<br>Reverse transfer capacitance | f = 1 MHz, $T_{vj}$ = 25°C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | $C_{res}$ | | 0,285 | | nF |
| Kollektor-Emitter-Reststrom<br>Collector-emitter cut-off current | $V_{CE}$ = 650 V, $V_{GE}$ = 0 V, $T_{vj}$ = 25°C | | $I_{CES}$ | | | 1,0 | 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 | $I_C$ = 150 A, $V_{CE}$ = 300 V<br>$V_{GE}$ = ±15 V<br>$R_{Gon}$ = 3,3 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $t_{d\,on}$ | | 0,12<br>0,14<br>0,14 | | µs<br>µs<br>µs |
| Anstiegszeit, induktive Last<br>Rise time, inductive load | $I_C$ = 150 A, $V_{CE}$ = 300 V<br>$V_{GE}$ = ±15 V<br>$R_{Gon}$ = 3,3 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $t_r$ | | 0,03<br>0,04<br>0,04 | | µs<br>µs<br>µs |
| Abschaltverzögerungszeit, induktive Last<br>Turn-off delay time, inductive load | $I_C$ = 150 A, $V_{CE}$ = 300 V<br>$V_{GE}$ = ±15 V<br>$R_{Goff}$ = 3,3 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $t_{d\,off}$ | | 0,34<br>0,37<br>0,38 | | µs<br>µs<br>µs |
| Fallzeit, induktive Last<br>Fall time, inductive load | $I_C$ = 150 A, $V_{CE}$ = 300 V<br>$V_{GE}$ = ±15 V<br>$R_{Goff}$ = 3,3 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $t_f$ | | 0,06<br>0,07<br>0,07 | | µs<br>µs<br>µs |
| Einschaltverlustenergie pro Puls<br>Turn-on energy loss per pulse | $I_C$ = 150 A, $V_{CE}$ = 300 V, $L_S$ = 30 nH<br>$V_{GE}$ = ±15 V, di/dt = 5400 A/µs ($T_{vj}$ = 150°C)<br>$R_{Gon}$ = 3,3 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $E_{on}$ | | 0,94<br>1,50<br>1,65 | | mJ<br>mJ<br>mJ |
| Abschaltverlustenergie pro Puls<br>Turn-off energy loss per pulse | $I_C$ = 150 A, $V_{CE}$ = 300 V, $L_S$ = 30 nH<br>$V_{GE}$ = ±15 V, du/dt = 3800 V/µs ($T_{vj}$ = 150°C)<br>$R_{Goff}$ = 3,3 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $E_{off}$ | | 5,75<br>7,40<br>7,85 | | mJ<br>mJ<br>mJ |
| Kurzschlußverhalten<br>SC data | $V_{GE} \leq$ 15 V, $V_{CC}$ = 360 V<br>$V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$ | $t_P \leq$ 10 µs, $T_{vj}$ = 25°C<br>$t_P \leq$ 10 µs, $T_{vj}$ = 150°C | $I_{SC}$ | | 720<br>570 | | A<br>A |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case | pro IGBT / per IGBT | | $R_{thJC}$ | | | 0,35 | K/W |
| 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) | | $R_{thCH}$ | | 0,14 | | K/W |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions | | | $T_{vj\,op}$ | -40 | | 150 | °C |


| | |
|---|---|
| prepared by: AS | date of publication: 2013-11-05 |
| 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°C | $V_{RRM}$ | 650 | | V |
| Dauergleichstrom<br>Continuous DC forward current | | $I_F$ | 150 | | A |
| Periodischer Spitzenstrom<br>Repetitive peak forward current | $t_P$ = 1 ms | $I_{FRM}$ | 300 | | A |
| Grenzlastintegral<br>I²t - value | $V_R$ = 0 V, $t_P$ = 10 ms, $T_{vj}$ = 125°C<br>$V_R$ = 0 V, $t_P$ = 10 ms, $T_{vj}$ = 150°C | I²t | 2050<br>1950 | | A²s<br>A²s |

### Charakteristische Werte / Characteristic Values

| | | | min. | typ. | max. | |
|---|---|---|---|---|---|---|
| Durchlassspannung<br>Forward voltage | $I_F$ = 150 A, $V_{GE}$ = 0 V<br>$I_F$ = 150 A, $V_{GE}$ = 0 V<br>$I_F$ = 150 A, $V_{GE}$ = 0 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $V_F$ | | 1,55<br>1,50<br>1,45 | 1,95 | V<br>V<br>V |
| Rückstromspitze<br>Peak reverse recovery current | $I_F$ = 150 A, - $di_F/dt$ = 5400 A/µs ($T_{vj}$=150°C)<br>$V_R$ = 300 V<br>$V_{GE}$ = -15 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $I_{RM}$ | | 150<br>180<br>185 | | A<br>A<br>A |
| Sperrverzögerungsladung<br>Recovered charge | $I_F$ = 150 A, - $di_F/dt$ = 5400 A/µs ($T_{vj}$=150°C)<br>$V_R$ = 300 V<br>$V_{GE}$ = -15 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $Q_r$ | | 7,00<br>13,0<br>15,0 | | µC<br>µC<br>µC |
| Abschaltenergie pro Puls<br>Reverse recovery energy | $I_F$ = 150 A, - $di_F/dt$ = 5400 A/µs ($T_{vj}$=150°C)<br>$V_R$ = 300 V<br>$V_{GE}$ = -15 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $E_{rec}$ | | 1,95<br>3,50<br>3,95 | | mJ<br>mJ<br>mJ |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case | pro Diode / per diode | | $R_{thJC}$ | | | 0,60 | K/W |
| 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) | | $R_{thCH}$ | | 0,245 | | K/W |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions | | | $T_{vj\,op}$ | -40 | | 150 | °C |

## Diode, Gleichrichter / Diode, Rectifier

### Höchstzulässige Werte / Maximum Rated Values

| | | | | | |
|---|---|---|---|---|---|
| Periodische Spitzensperrspannung<br>Repetitive peak reverse voltage | $T_{vj}$ = 25°C | $V_{RRM}$ | 1600 | | V |
| Durchlassstrom Grenzeffektivwert pro Chip<br>Maximum RMS forward current per chip | $T_C$ = 80°C | $I_{FRMSM}$ | 150 | | A |
| Gleichrichter Ausgang Grenzeffektivstrom<br>Maximum RMS current at rectifier output | $T_C$ = 80°C | $I_{RMSM}$ | 150 | | A |
| Stoßstrom Grenzwert<br>Surge forward current | $t_p$ = 10 ms, $T_{vj}$ = 25°C<br>$t_p$ = 10 ms, $T_{vj}$ = 150°C | $I_{FSM}$ | 1150<br>880 | | A<br>A |
| Grenzlastintegral<br>I²t - value | $t_p$ = 10 ms, $T_{vj}$ = 25°C<br>$t_p$ = 10 ms, $T_{vj}$ = 150°C | I²t | 6600<br>3850 | | A²s<br>A²s |

### Charakteristische Werte / Characteristic Values

| | | | min. | typ. | max. | |
|---|---|---|---|---|---|---|
| Durchlassspannung<br>Forward voltage | $T_{vj}$ = 150°C, $I_F$ = 150 A | $V_F$ | | 1,10 | | V |
| Sperrstrom<br>Reverse current | $T_{vj}$ = 150°C, $V_R$ = 1600 V | $I_R$ | | 1,00 | | mA |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case | pro Diode / per diode | $R_{thJC}$ | | | 0,40 | K/W |
| 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) | $R_{thCH}$ | | 0,165 | | K/W |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions | | $T_{vj\,op}$ | -40 | | 150 | °C |


| | |
|---|---|
| prepared by: AS | date of publication: 2013-11-05 |
| 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°C | $V_{CES}$ | 650 | V |
| Kollektor-Dauergleichstrom<br>Continuous DC collector current | $T_C$ = 70°C, $T_{vj\,max}$ = 175°C | $I_{C\,nom}$ | 100 | A |
| Periodischer Kollektor-Spitzenstrom<br>Repetitive peak collector current | $t_P$ = 1 ms | $I_{CRM}$ | 200 | A |
| Gesamt-Verlustleistung<br>Total power dissipation | $T_C$ = 25°C, $T_{vj\,max}$ = 175°C | $P_{tot}$ | 335 | 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 | $I_C$ = 100 A, $V_{GE}$ = 15 V<br>$I_C$ = 100 A, $V_{GE}$ = 15 V<br>$I_C$ = 100 A, $V_{GE}$ = 15 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $V_{CE\,sat}$ | | 1,55<br>1,70<br>1,75 | 1,95 | V<br>V<br>V |
| Gate-Schwellenspannung<br>Gate threshold voltage | $I_C$ = 1,60 mA, $V_{CE}$ = $V_{GE}$, $T_{vj}$ = 25°C | | $V_{GEth}$ | 5,0 | 5,8 | 6,5 | V |
| Gateladung<br>Gate charge | $V_{GE}$ = -15 V ... +15 V | | $Q_G$ | | 1,00 | | µC |
| Interner Gatewiderstand<br>Internal gate resistor | $T_{vj}$ = 25°C | | $R_{Gint}$ | | 2,0 | | Ω |
| Eingangskapazität<br>Input capacitance | f = 1 MHz, $T_{vj}$ = 25°C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | $C_{ies}$ | | 6,20 | | nF |
| Rückwirkungskapazität<br>Reverse transfer capacitance | f = 1 MHz, $T_{vj}$ = 25°C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | $C_{res}$ | | 0,19 | | nF |
| Kollektor-Emitter-Reststrom<br>Collector-emitter cut-off current | $V_{CE}$ = 650 V, $V_{GE}$ = 0 V, $T_{vj}$ = 25°C | | $I_{CES}$ | | | 1,0 | 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 | $I_C$ = 100 A, $V_{CE}$ = 300 V<br>$V_{GE}$ = ±15 V<br>$R_{Gon}$ = 3,3 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $t_{d\,on}$ | | 0,07<br>0,08<br>0,08 | | µs<br>µs<br>µs |
| Anstiegszeit, induktive Last<br>Rise time, inductive load | $I_C$ = 100 A, $V_{CE}$ = 300 V<br>$V_{GE}$ = ±15 V<br>$R_{Gon}$ = 3,3 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $t_r$ | | 0,02<br>0,02<br>0,02 | | µs<br>µs<br>µs |
| Abschaltverzögerungszeit, induktive Last<br>Turn-off delay time, inductive load | $I_C$ = 100 A, $V_{CE}$ = 300 V<br>$V_{GE}$ = ±15 V<br>$R_{Goff}$ = 3,3 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $t_{d\,off}$ | | 0,26<br>0,29<br>0,30 | | µs<br>µs<br>µs |
| Fallzeit, induktive Last<br>Fall time, inductive load | $I_C$ = 100 A, $V_{CE}$ = 300 V<br>$V_{GE}$ = ±15 V<br>$R_{Goff}$ = 3,3 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $t_f$ | | 0,07<br>0,07<br>0,07 | | µs<br>µs<br>µs |
| Einschaltverlustenergie pro Puls<br>Turn-on energy loss per pulse | $I_C$ = 100 A, $V_{CE}$ = 300 V, $L_S$ = 30 nH<br>$V_{GE}$ = ±15 V, di/dt = 5100 A/µs ($T_{vj}$ = 150°C)<br>$R_{Gon}$ = 3,3 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $E_{on}$ | | 0,33<br>0,77<br>0,88 | | mJ<br>mJ<br>mJ |
| Abschaltverlustenergie pro Puls<br>Turn-off energy loss per pulse | $I_C$ = 100 A, $V_{CE}$ = 300 V, $L_S$ = 30 nH<br>$V_{GE}$ = ±15 V, du/dt = 4000 V/µs ($T_{vj}$ = 150°C)<br>$R_{Goff}$ = 3,3 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $E_{off}$ | | 3,50<br>4,70<br>4,90 | | mJ<br>mJ<br>mJ |
| Kurzschlußverhalten<br>SC data | $V_{GE}$ ≤ 15 V, $V_{CC}$ = 360 V<br>$V_{CEmax}$ = $V_{CES}$ -$L_{sCE}$ ·di/dt | $t_P$ ≤ 10 µs, $T_{vj}$ = 25°C<br>$t_P$ ≤ 10 µs, $T_{vj}$ = 150°C | $I_{SC}$ | | 480<br>380 | | A<br>A |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case | pro IGBT / per IGBT | | $R_{thJC}$ | | | 0,45 | K/W |
| 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) | | $R_{thCH}$ | | 0,185 | | K/W |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions | | | $T_{vj\,op}$ | -40 | | 150 | °C |


| | |
|---|---|
| prepared by: AS | date of publication: 2013-11-05 |
| approved by: RS | revision: 2.0 |

**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 | $V_{RRM}$ | 650 | V |
| Dauergleichstrom<br>Continuous DC forward current | | $I_F$ | 50 | A |
| Periodischer Spitzenstrom<br>Repetitive peak forward current | $t_P$ = 1 ms | $I_{FRM}$ | 100 | A |
| Grenzlastintegral<br>I²t - value | $V_R$ = 0 V, $t_P$ = 10 ms, $T_{vj}$ = 125°C<br>$V_R$ = 0 V, $t_P$ = 10 ms, $T_{vj}$ = 150°C | I²t | 330<br>300 | A²s<br>A²s |

### Charakteristische Werte / Characteristic Values

| | | | min. | typ. | max. | |
|---|---|---|---|---|---|---|
| Durchlassspannung<br>Forward voltage | $I_F$ = 50 A, $V_{GE}$ = 0 V<br>$I_F$ = 50 A, $V_{GE}$ = 0 V<br>$I_F$ = 50 A, $V_{GE}$ = 0 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $V_F$ | | 1,55<br>1,50<br>1,45 | 1,95 | V<br>V<br>V |
| Rückstromspitze<br>Peak reverse recovery current | $I_F$ = 50 A, - $di_F/dt$ = 2800 A/µs ($T_{vj}$=150°C)<br>$V_R$ = 300 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $I_{RM}$ | | 69,0<br>76,0<br>80,0 | | A<br>A<br>A |
| Sperrverzögerungsladung<br>Recovered charge | $I_F$ = 50 A, - $di_F/dt$ = 2800 A/µs ($T_{vj}$=150°C)<br>$V_R$ = 300 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $Q_r$ | | 1,90<br>3,40<br>3,95 | | µC<br>µC<br>µC |
| Abschaltenergie pro Puls<br>Reverse recovery energy | $I_F$ = 50 A, - $di_F/dt$ = 2800 A/µs ($T_{vj}$=150°C)<br>$V_R$ = 300 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $E_{rec}$ | | 0,60<br>0,95<br>1,10 | | mJ<br>mJ<br>mJ |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case | pro Diode / per diode | | $R_{thJC}$ | | | 1,20 | K/W |
| 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) | | $R_{thCH}$ | | 0,49 | | K/W |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions | | | $T_{vj\,op}$ | -40 | | 150 | °C |

## NTC-Widerstand / NTC-Thermistor

### Charakteristische Werte / Characteristic Values

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

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

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| approved by: RS | revision: 2.0 |

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

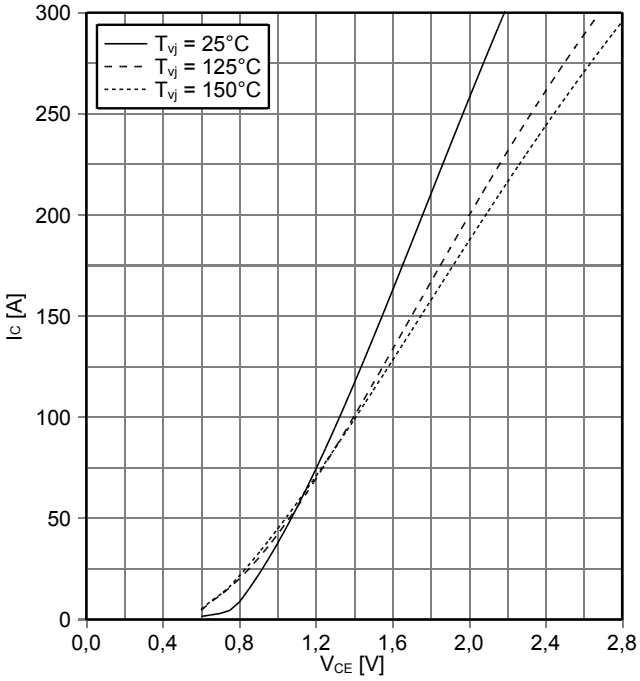
## Modul / Module

| | | | | | | |
|---|---|---|---|---|---|---|
| Isolations-Prüfspannung<br>Isolation test voltage | RMS, f = 50 Hz, t = 1 min. | $V_{ISOL}$ | | 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) | | | $Al_2O_3$ | | |
| 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>$\lambda_{Paste}$ = 1 W/(m·K) / $\lambda_{grease}$ = 1 W/(m·K) | $R_{thCH}$ | | 0,009 | | K/W |
| Modulstreuinduktivität<br>Stray inductance module | | $L_{sCE}$ | | 40 | | nH |
| Modulleitungswiderstand, Anschlüsse - Chip<br>Module lead resistance, terminals - chip | $T_C$ = 25°C, pro Schalter / per switch | $R_{CC'+EE'}$<br>$R_{AA'+CC'}$ | | 4,00<br>2,00 | | mΩ |
| Höchstzulässige Sperrschichttemperatur<br>Maximum junction temperature | Wechselrichter, Brems-Chopper / inverter, brake-chopper<br>Gleichrichter / rectifier | $T_{vj\ max}$ | | | 175<br>150 | °C<br>°C |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions | Wechselrichter, Brems-Chopper / inverter, brake-chopper<br>Gleichrichter / rectifier | $T_{vj\ op}$ | -40<br>-40 | | 150<br>150 | °C<br>°C |
| Lagertemperatur<br>Storage temperature | | $T_{stg}$ | -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 | | 300 | | g |

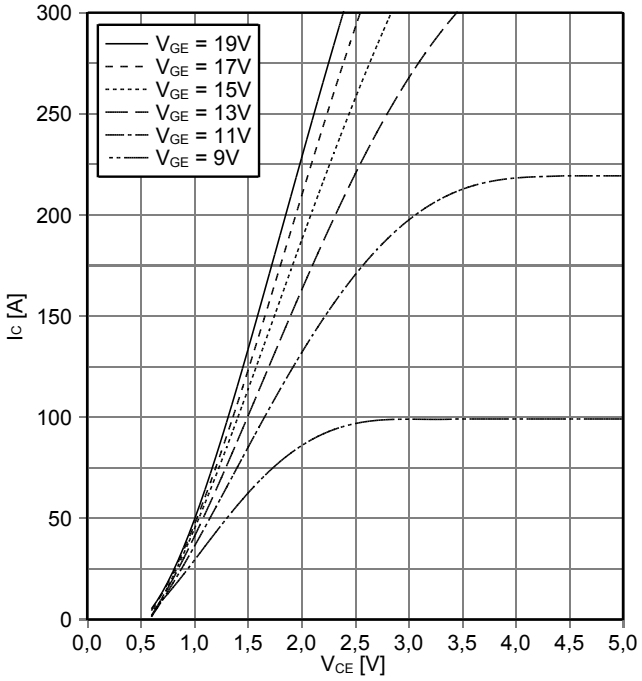
bei Betrieb mit Vge = 0V/+15V empfehlen wir einen Rgon,min von 24 Ohm und eine Rgoff,min von 24 Ohm (siehe AN 2006-01)
for operation with Vge= 0V/+15V we recommend a Rgon,min of 24 ohms and a Rgoff,min of 24 ohms (see AN 2006-01)

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

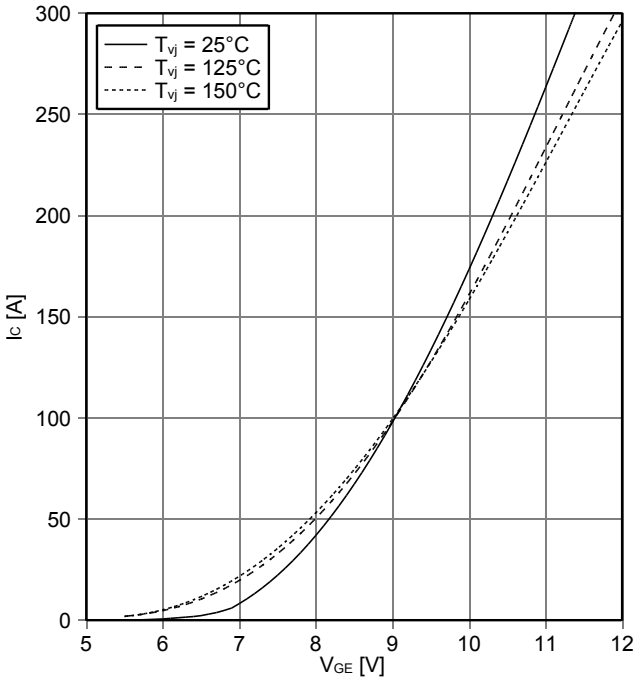
**Ausgangskennlinie IGBT,Wechselrichter (typisch)**
**output characteristic IGBT,Inverter (typical)**
$I_C = f(V_{CE})$
$V_{GE}$ = 15 V



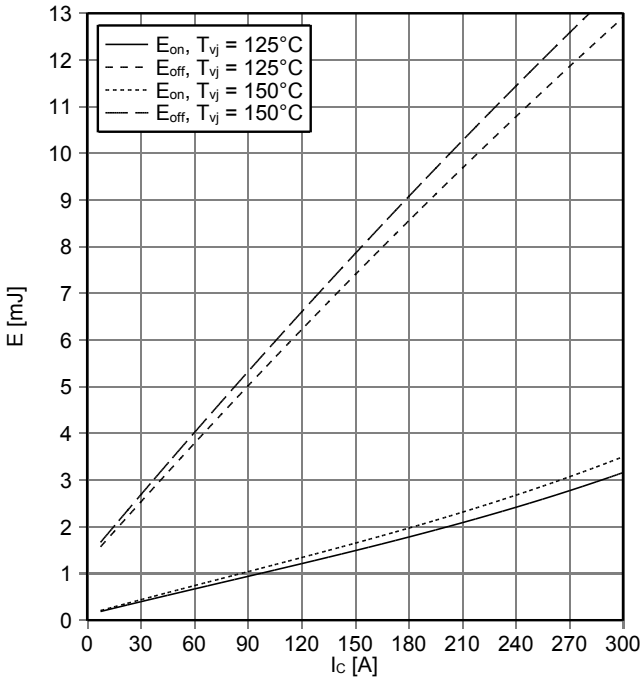

**Ausgangskennlinienfeld IGBT,Wechselrichter (typisch)**
**output characteristic IGBT,Inverter (typical)**
$I_C = f(V_{CE})$
$T_{vj}$ = 150°C




**Übertragungscharakteristik IGBT,Wechselrichter (typisch)**
**transfer characteristic IGBT,Inverter (typical)**
$I_C = f(V_{GE})$
$V_{CE}$ = 20 V




**Schaltverluste IGBT,Wechselrichter (typisch)**
**switching losses IGBT,Inverter (typical)**
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
$V_{GE}$ = ±15 V, $R_{Gon}$ = 3.3 Ω, $R_{Goff}$ = 3.3 Ω, $V_{CE}$ = 300 V

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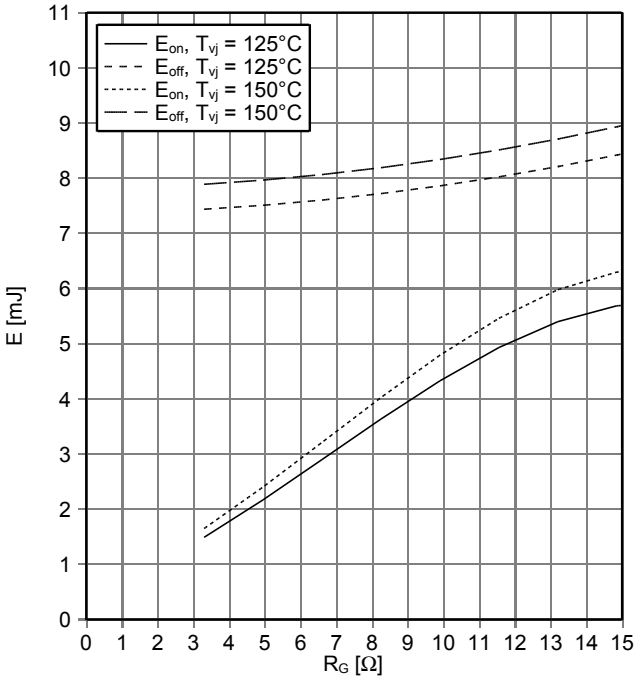
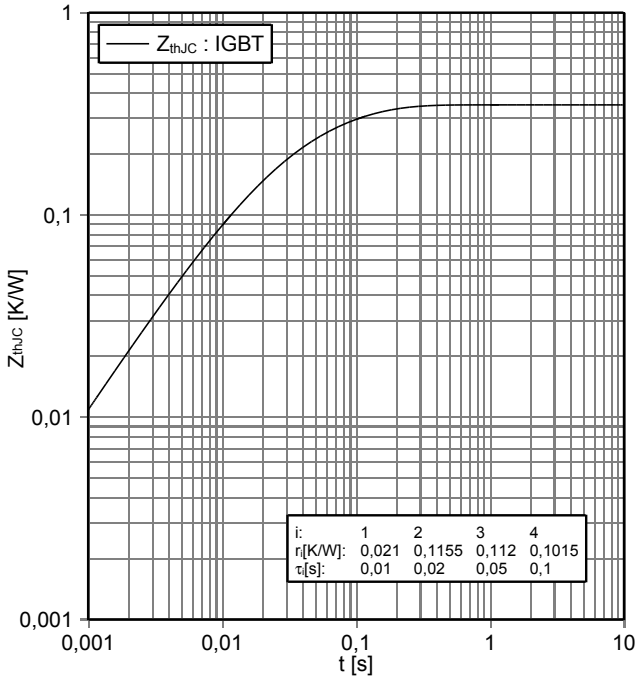
| prepared by: AS | date of publication: 2013-11-05 |
| approved by: RS | revision: 2.0 |

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

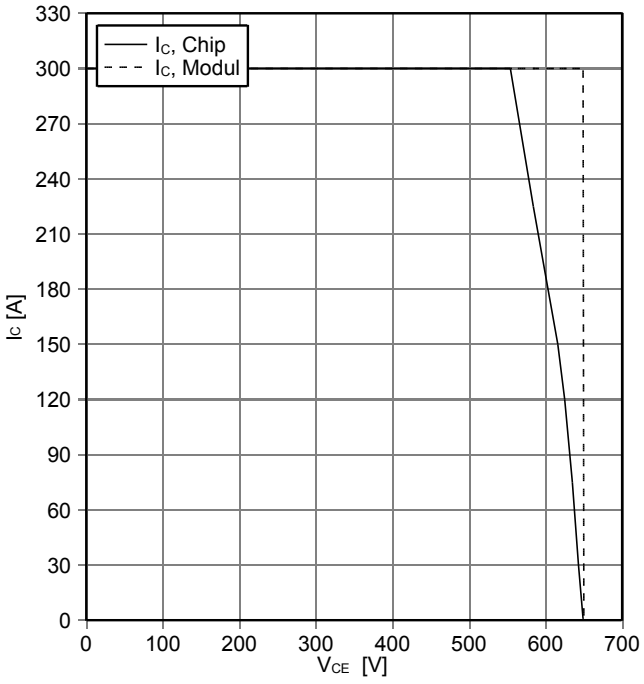
**Schaltverluste IGBT,Wechselrichter (typisch)**
**switching losses IGBT,Inverter (typical)**
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
$V_{GE}$ = ±15 V, $I_C$ = 150 A, $V_{CE}$ = 300 V



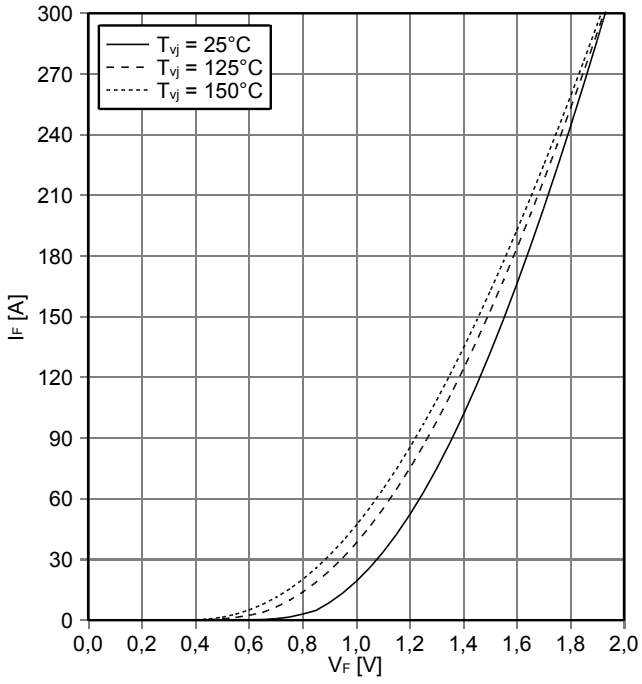

**Transienter Wärmewiderstand IGBT,Wechselrichter**
**transient thermal impedance IGBT,Inverter**
$Z_{thJC} = f(t)$




**Sicherer Rückwärts-Arbeitsbereich IGBT,Wechselrichter (RBSOA)**
**reverse bias safe operating area IGBT,Inverter (RBSOA)**
$I_C = f(V_{CE})$
$V_{GE}$ = ±15 V, $R_{Goff}$ = 3.3 Ω, $T_{vj}$ = 150°C




**Durchlasskennlinie der Diode, Wechselrichter (typisch)**
**forward characteristic of Diode, Inverter (typical)**
$I_F = f(V_F)$

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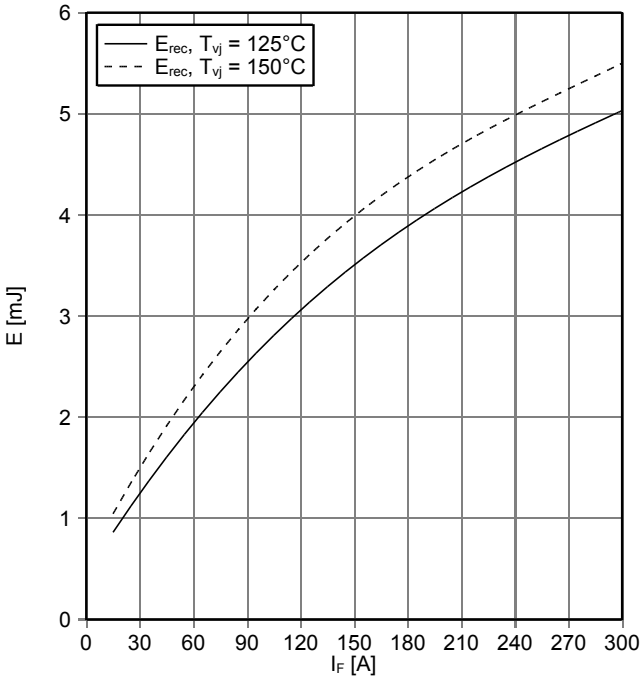
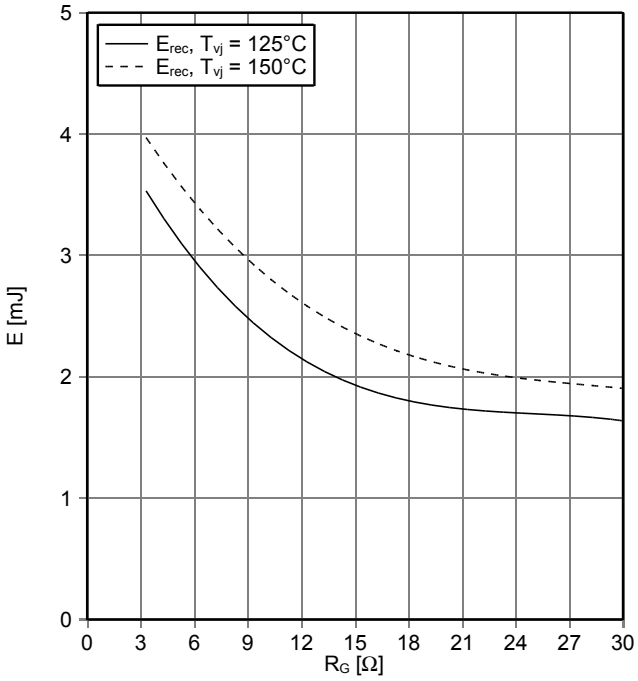
**Vorläufige Daten**
**Preliminary Data**

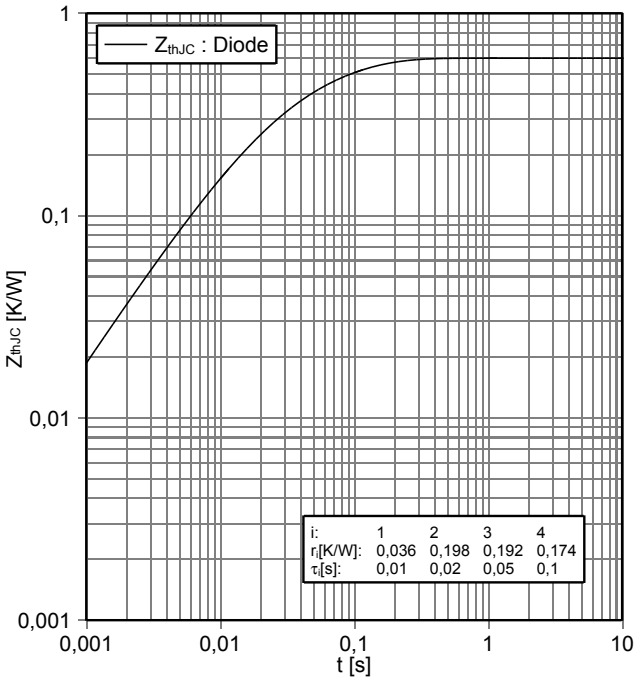
**Schaltverluste Diode, Wechselrichter (typisch)**
**switching losses Diode, Inverter (typical)**
$E_{rec} = f(I_F)$
$R_{Gon} = 3.3\ \Omega$, $V_{CE} = 300$ V



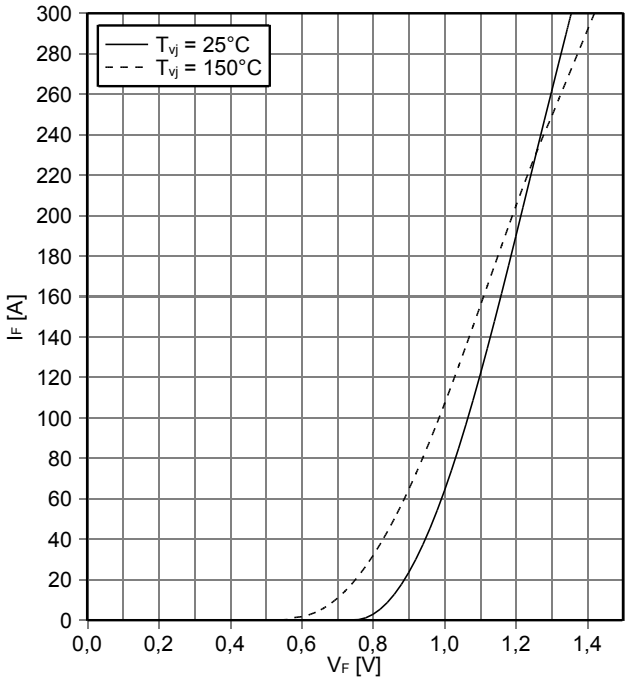

**Schaltverluste Diode, Wechselrichter (typisch)**
**switching losses Diode, Inverter (typical)**
$E_{rec} = f(R_G)$
$I_F = 150$ A, $V_{CE} = 300$ V




**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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|---|---|
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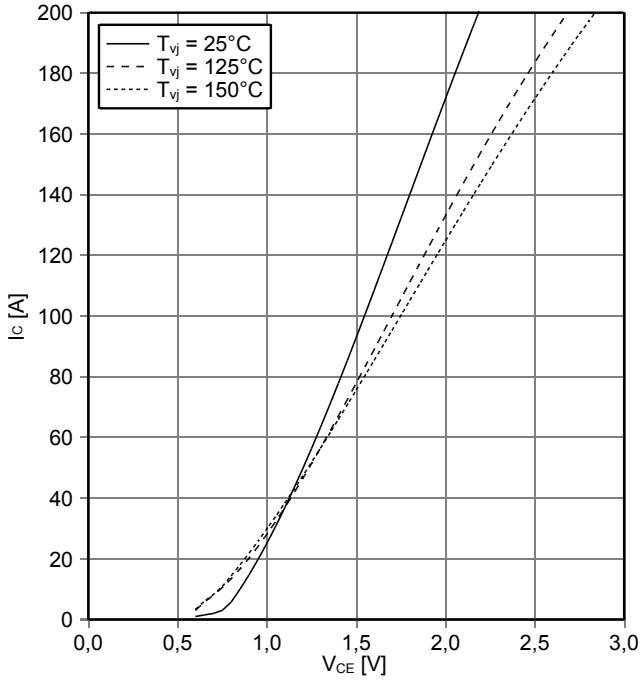
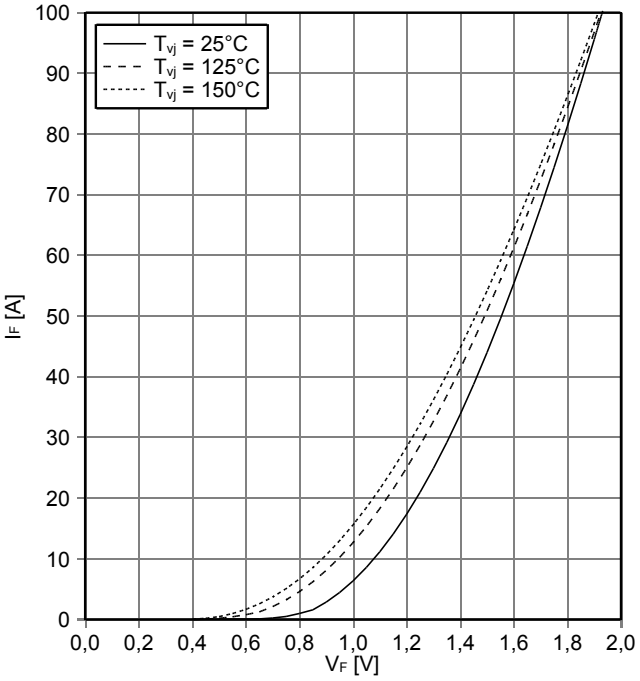
**Vorläufige Daten**
**Preliminary Data**

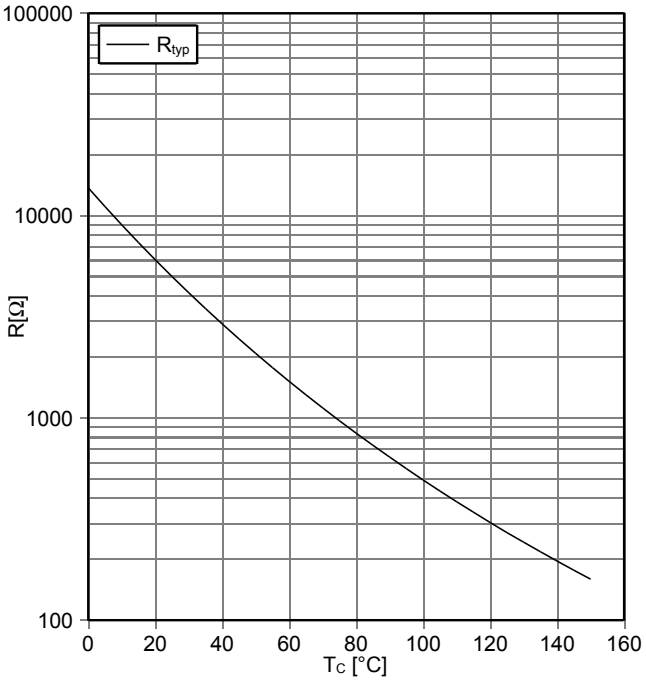
**Ausgangskennlinie IGBT, Brems-Chopper (typisch)**
**output characteristic IGBT, Brake-Chopper (typical)**
$I_C = f(V_{CE})$
$V_{GE}$ = 15 V




**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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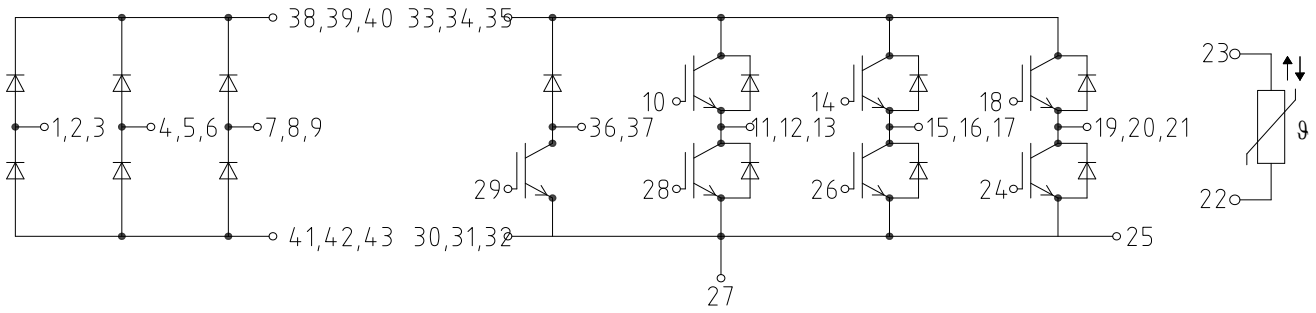
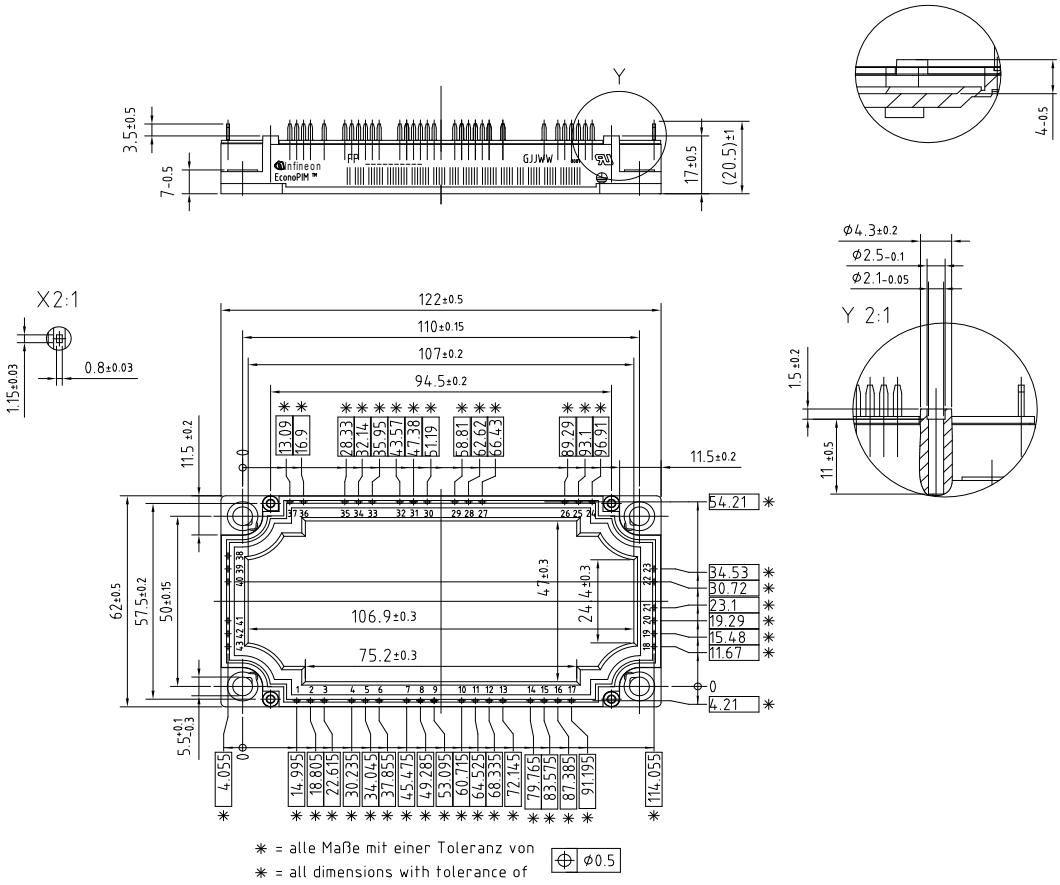
| prepared by: AS | date of publication: 2013-11-05 |
| approved by: RS | revision: 2.0 |

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

## Schaltplan / circuit_diagram_headline




## Gehäuseabmessungen / package outlines

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

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