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With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

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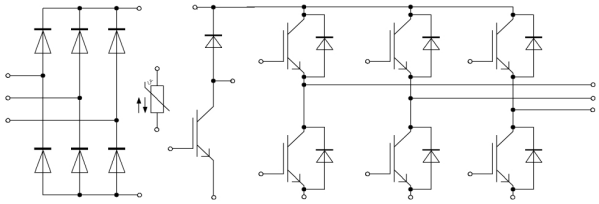
# Technische Information / Technical Information

IGBT-Module
IGBT-modules

# FP35R12U1T4

SmartPIM1 Modul mit Trench/Feldstopp IGBT4 und Emitter Controlled 4 Diode und PressFIT / NTC
SmartPIM1 module with Trench/Fieldstop IGBT4 and Emitter Controlled 4 diode and PressFIT / NTC

**Vorläufige Daten / Preliminary Data**

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

## Typische Anwendungen

- Hilfsumrichter
- Klimaanlagen
- Motorantriebe
- Servoumrichter

## Typical Applications

- Auxiliary Inverters
- Air Conditioning
- Motor Drives
- Servo Drives

## Elektrische Eigenschaften

- Niedrige Schaltverluste
- Trench IGBT 4
- $T_{vj\ op}$ = 150°C
- Niedriges $V_{CEsat}$

## Electrical Features

- Low Switching Losses
- Trench IGBT 4
- $T_{vj\ op}$ = 150°C
- Low $V_{CEsat}$

## Mechanische Eigenschaften

- $Al_2O_3$ Substrat mit kleinem thermischen Widerstand
- Robuste Duplex-Rahmen Konstruktion
- Robuste selbsteinpressende Montage

## Mechanical Features

- $Al_2O_3$ Substrate with Low Thermal Resistance
- Rugged Duplex frame construction
- Rugged selfacting PressFIT assembly

## Module Label Code

**Barcode Code 128**

Sample
00000123456000000000000

**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: DK | date of publication: 2013-11-05 | |
| approved by: MB | 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 | $V_{CES}$ | 1200 | V |
| Kollektor-Dauergleichstrom<br>Continuous DC collector current | $T_C$ = 100°C, $T_{vj\,max}$ = 175°C<br>$T_C$ = 25°C, $T_{vj\,max}$ = 175°C | $I_{C\,nom}$<br>$I_C$ | 35<br>54 | A<br>A |
| Periodischer Kollektor-Spitzenstrom<br>Repetitive peak collector current | $t_P$ = 1 ms | $I_{CRM}$ | 70 | A |
| Gesamt-Verlustleistung<br>Total power dissipation | $T_C$ = 25°C, $T_{vj\,max}$ = 175°C | $P_{tot}$ | 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 | $I_C$ = 35 A, $V_{GE}$ = 15 V<br>$I_C$ = 35 A, $V_{GE}$ = 15 V<br>$I_C$ = 35 A, $V_{GE}$ = 15 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $V_{CE\,sat}$ | | 1,85<br>2,15<br>2,25 | 2,25 | V<br>V<br>V |
| Gate-Schwellenspannung<br>Gate threshold voltage | $I_C$ = 1,20 mA, $V_{CE}$ = $V_{GE}$, $T_{vj}$ = 25°C | | $V_{GEth}$ | 5,2 | 5,8 | 6,4 | V |
| Gateladung<br>Gate charge | $V_{GE}$ = -15 V ... +15 V | | $Q_G$ | | 0,27 | | µC |
| Interner Gatewiderstand<br>Internal gate resistor | $T_{vj}$ = 25°C | | $R_{Gint}$ | | 0,0 | | Ω |
| Eingangskapazität<br>Input capacitance | f = 1 MHz, $T_{vj}$ = 25°C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | $C_{ies}$ | | 2,00 | | nF |
| Rückwirkungskapazität<br>Reverse transfer capacitance | f = 1 MHz, $T_{vj}$ = 25°C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | $C_{res}$ | | 0,07 | | nF |
| Kollektor-Emitter-Reststrom<br>Collector-emitter cut-off current | $V_{CE}$ = 1200 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 | $I_C$ = 35 A, $V_{CE}$ = 600 V<br>$V_{GE}$ = ±15 V<br>$R_{Gon}$ = 12 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $t_{d\,on}$ | | 0,025<br>0,025<br>0,025 | | µs<br>µs<br>µs |
| Anstiegszeit, induktive Last<br>Rise time, inductive load | $I_C$ = 35 A, $V_{CE}$ = 600 V<br>$V_{GE}$ = ±15 V<br>$R_{Gon}$ = 12 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $t_r$ | | 0,013<br>0,016<br>0,018 | | µs<br>µs<br>µs |
| Abschaltverzögerungszeit, induktive Last<br>Turn-off delay time, inductive load | $I_C$ = 35 A, $V_{CE}$ = 600 V<br>$V_{GE}$ = ±15 V<br>$R_{Goff}$ = 12 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $t_{d\,off}$ | | 0,24<br>0,295<br>0,31 | | µs<br>µs<br>µs |
| Fallzeit, induktive Last<br>Fall time, inductive load | $I_C$ = 35 A, $V_{CE}$ = 600 V<br>$V_{GE}$ = ±15 V<br>$R_{Goff}$ = 12 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $t_f$ | | 0,115<br>0,17<br>0,20 | | µs<br>µs<br>µs |
| Einschaltverlustenergie pro Puls<br>Turn-on energy loss per pulse | $I_C$ = 35 A, $V_{CE}$ = 600 V, $L_S$ = 35 nH<br>$V_{GE}$ = ±15 V, di/dt = 2500 A/µs ($T_{vj}$ = 150°C)<br>$R_{Gon}$ = 12 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $E_{on}$ | | 1,90<br>2,90<br>3,15 | | mJ<br>mJ<br>mJ |
| Abschaltverlustenergie pro Puls<br>Turn-off energy loss per pulse | $I_C$ = 35 A, $V_{CE}$ = 600 V, $L_S$ = 35 nH<br>$V_{GE}$ = ±15 V, du/dt = 3600 V/µs ($T_{vj}$ = 150°C)<br>$R_{Goff}$ = 12 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $E_{off}$ | | 2,00<br>2,90<br>3,20 | | mJ<br>mJ<br>mJ |
| Kurzschlußverhalten<br>SC data | $V_{GE} \leq$ 15 V, $V_{CC}$ = 800 V<br>$V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$ | $t_P \leq$ 10 µs, $T_{vj}$ = 150°C | $I_{SC}$ | | 130 | | A |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case | pro IGBT / per IGBT | | $R_{thJC}$ | | 0,55 | 0,60 | 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) | | $R_{thCH}$ | | 0,50 | | K/W |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions | | | $T_{vj\,op}$ | -40 | | 150 | °C |


| | |
|---|---|
| prepared by: DK | date of publication: 2013-11-05 |
| approved by: MB | 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 | $V_{RRM}$ | 1200 | V |
| Dauergleichstrom<br>Continuous DC forward current | | $I_F$ | 35 | A |
| Periodischer Spitzenstrom<br>Repetitive peak forward current | $t_P$ = 1 ms | $I_{FRM}$ | 70 | 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 | 240<br>220 | A²s<br>A²s |

### Charakteristische Werte / Characteristic Values

| | | | min. | typ. | max. | |
|---|---|---|---|---|---|---|
| Durchlassspannung<br>Forward voltage | $I_F$ = 35 A, $V_{GE}$ = 0 V<br>$I_F$ = 35 A, $V_{GE}$ = 0 V<br>$I_F$ = 35 A, $V_{GE}$ = 0 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $V_F$ | | 1,65<br>1,65<br>1,65 | 2,15 | V<br>V<br>V |
| Rückstromspitze<br>Peak reverse recovery current | $I_F$ = 35 A, - $di_F/dt$ = 2500 A/µs ($T_{vj}$=150°C)<br>$V_R$ = 600 V<br>$V_{GE}$ = -15 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $I_{RM}$ | | 81,0<br>85,0<br>88,0 | | A<br>A<br>A |
| Sperrverzögerungsladung<br>Recovered charge | $I_F$ = 35 A, - $di_F/dt$ = 2500 A/µs ($T_{vj}$=150°C)<br>$V_R$ = 600 V<br>$V_{GE}$ = -15 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $Q_r$ | | 3,95<br>6,80<br>7,50 | | µC<br>µC<br>µC |
| Abschaltenergie pro Puls<br>Reverse recovery energy | $I_F$ = 35 A, - $di_F/dt$ = 2500 A/µs ($T_{vj}$=150°C)<br>$V_R$ = 600 V<br>$V_{GE}$ = -15 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $E_{rec}$ | | 1,50<br>2,70<br>2,95 | | mJ<br>mJ<br>mJ |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case | pro Diode / per diode | | $R_{thJC}$ | | 0,70 | 0,80 | 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) | | $R_{thCH}$ | | 0,65 | | 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 | $T_C$ = 100°C | $I_{FRMSM}$ | 50 | A |
| Gleichrichter Ausgang Grenzeffektivstrom<br>Maximum RMS current at rectifier output | $T_C$ = 100°C | $I_{RMSM}$ | 50 | A |
| Stoßstrom Grenzwert<br>Surge forward current | $t_p$ = 10 ms, $T_{vj}$ = 25°C<br>$t_p$ = 10 ms, $T_{vj}$ = 150°C | $I_{FSM}$ | 450<br>370 | 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 | 1000<br>685 | A²s<br>A²s |

### Charakteristische Werte / Characteristic Values

| | | | min. | typ. | max. | |
|---|---|---|---|---|---|---|
| Durchlassspannung<br>Forward voltage | $T_{vj}$ = 150°C, $I_F$ = 35 A | $V_F$ | | 0,95 | | 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 | $R_{thJC}$ | | 0,95 | 1,05 | 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) | $R_{thCH}$ | | 0,85 | | K/W |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions | | $T_{vj\,op}$ | | | | °C |

| | |
|---|---|
| prepared by: DK | date of publication: 2013-11-05 |
| approved by: MB | 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 | $V_{CES}$ | 1200 | V |
| Kollektor-Dauergleichstrom<br>Continuous DC collector current | $T_C$ = 100°C, $T_{vj\,max}$ = 175°C<br>$T_C$ = 25°C, $T_{vj\,max}$ = 175°C | $I_{C\,nom}$<br>$I_C$ | 35<br>54 | A<br>A |
| Periodischer Kollektor-Spitzenstrom<br>Repetitive peak collector current | $t_P$ = 1 ms | $I_{CRM}$ | 70 | A |
| Gesamt-Verlustleistung<br>Total power dissipation | $T_C$ = 25°C, $T_{vj\,max}$ = 175°C | $P_{tot}$ | 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 | $I_C$ = 35 A, $V_{GE}$ = 15 V<br>$I_C$ = 35 A, $V_{GE}$ = 15 V<br>$I_C$ = 35 A, $V_{GE}$ = 15 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $V_{CE\,sat}$ | | 1,85<br>2,15<br>2,25 | 2,25 | V<br>V<br>V |
| Gate-Schwellenspannung<br>Gate threshold voltage | $I_C$ = 1,20 mA, $V_{CE}$ = $V_{GE}$, $T_{vj}$ = 25°C | | $V_{GEth}$ | 5,2 | 5,8 | 6,4 | V |
| Gateladung<br>Gate charge | $V_{GE}$ = -15 V ... +15 V | | $Q_G$ | | 0,27 | | µC |
| Interner Gatewiderstand<br>Internal gate resistor | $T_{vj}$ = 25°C | | $R_{Gint}$ | | 0,0 | | Ω |
| Eingangskapazität<br>Input capacitance | f = 1 MHz, $T_{vj}$ = 25°C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | $C_{ies}$ | | 2,00 | | nF |
| Rückwirkungskapazität<br>Reverse transfer capacitance | f = 1 MHz, $T_{vj}$ = 25°C, $V_{CE}$ = 25 V, $V_{GE}$ = 0 V | | $C_{res}$ | | 0,07 | | nF |
| Kollektor-Emitter-Reststrom<br>Collector-emitter cut-off current | $V_{CE}$ = 1200 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 | $I_C$ = 35 A, $V_{CE}$ = 600 V<br>$V_{GE}$ = ±15 V<br>$R_{Gon}$ = 47 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $t_{d\,on}$ | | 0,07<br>0,07<br>0,07 | | µs<br>µs<br>µs |
| Anstiegszeit, induktive Last<br>Rise time, inductive load | $I_C$ = 35 A, $V_{CE}$ = 600 V<br>$V_{GE}$ = ±15 V<br>$R_{Gon}$ = 47 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $t_r$ | | 0,045<br>0,05<br>0,057 | | µs<br>µs<br>µs |
| Abschaltverzögerungszeit, induktive Last<br>Turn-off delay time, inductive load | $I_C$ = 35 A, $V_{CE}$ = 600 V<br>$V_{GE}$ = ±15 V<br>$R_{Goff}$ = 47 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $t_{d\,off}$ | | 0,28<br>0,44<br>0,45 | | µs<br>µs<br>µs |
| Fallzeit, induktive Last<br>Fall time, inductive load | $I_C$ = 35 A, $V_{CE}$ = 600 V<br>$V_{GE}$ = ±15 V<br>$R_{Goff}$ = 47 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $t_f$ | | 0,115<br>0,175<br>0,205 | | µs<br>µs<br>µs |
| Einschaltverlustenergie pro Puls<br>Turn-on energy loss per pulse | $I_C$ = 35 A, $V_{CE}$ = 600 V, $L_S$ = 35 nH<br>$V_{GE}$ = ±15 V<br>$R_{Gon}$ = 47 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $E_{on}$ | | 5,00<br>6,50<br>7,00 | | mJ<br>mJ<br>mJ |
| Abschaltverlustenergie pro Puls<br>Turn-off energy loss per pulse | $I_C$ = 35 A, $V_{CE}$ = 600 V, $L_S$ = 35 nH<br>$V_{GE}$ = ±15 V<br>$R_{Goff}$ = 47 Ω | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $E_{off}$ | | 2,10<br>3,05<br>3,35 | | mJ<br>mJ<br>mJ |
| Kurzschlußverhalten<br>SC data | $V_{GE} \leq$ 15 V, $V_{CC}$ = 800 V<br>$V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$ | $t_P \leq$ 10 µs, $T_{vj}$ = 150°C | $I_{SC}$ | | 130 | | A |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case | pro IGBT / per IGBT | | $R_{thJC}$ | | 0,55 | 0,60 | 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) | | $R_{thCH}$ | | 0,50 | | K/W |
| Temperatur im Schaltbetrieb<br>Temperature under switching conditions | | | $T_{vj\,op}$ | -40 | | 150 | °C |

**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 | $V_{RRM}$ | 1200 | V |
| Dauergleichstrom<br>Continuous DC forward current | | $I_F$ | 10 | A |
| Periodischer Spitzenstrom<br>Repetitive peak forward current | $t_P$ = 1 ms | $I_{FRM}$ | 20 | 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 | 16,0<br>14,0 | A²s<br>A²s |

### Charakteristische Werte / Characteristic Values

| | | | min. | typ. | max. | |
|---|---|---|---|---|---|---|
| Durchlassspannung<br>Forward voltage | $I_F$ = 10 A, $V_{GE}$ = 0 V<br>$I_F$ = 10 A, $V_{GE}$ = 0 V<br>$I_F$ = 10 A, $V_{GE}$ = 0 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $V_F$ | | 1,75<br>1,75<br>1,75 | 2,25 | V<br>V<br>V |
| Rückstromspitze<br>Peak reverse recovery current | $I_F$ = 10 A, - $di_F/dt$ = 500 A/µs ($T_{vj}$=150°C)<br>$V_R$ = 600 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $I_{RM}$ | | 12,0<br>10,0<br>8,00 | | A<br>A<br>A |
| Sperrverzögerungsladung<br>Recovered charge | $I_F$ = 10 A, - $di_F/dt$ = 500 A/µs ($T_{vj}$=150°C)<br>$V_R$ = 600 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $Q_r$ | | 0,90<br>1,70<br>1,90 | | µC<br>µC<br>µC |
| Abschaltenergie pro Puls<br>Reverse recovery energy | $I_F$ = 10 A, - $di_F/dt$ = 500 A/µs ($T_{vj}$=150°C)<br>$V_R$ = 600 V | $T_{vj}$ = 25°C<br>$T_{vj}$ = 125°C<br>$T_{vj}$ = 150°C | $E_{rec}$ | | 0,24<br>0,52<br>0,59 | | mJ<br>mJ<br>mJ |
| Wärmewiderstand, Chip bis Gehäuse<br>Thermal resistance, junction to case | pro Diode / per diode | | $R_{thJC}$ | | 1,50 | 1,65 | 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) | | $R_{thCH}$ | | 1,20 | | 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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**Vorläufige Daten**
**Preliminary Data**

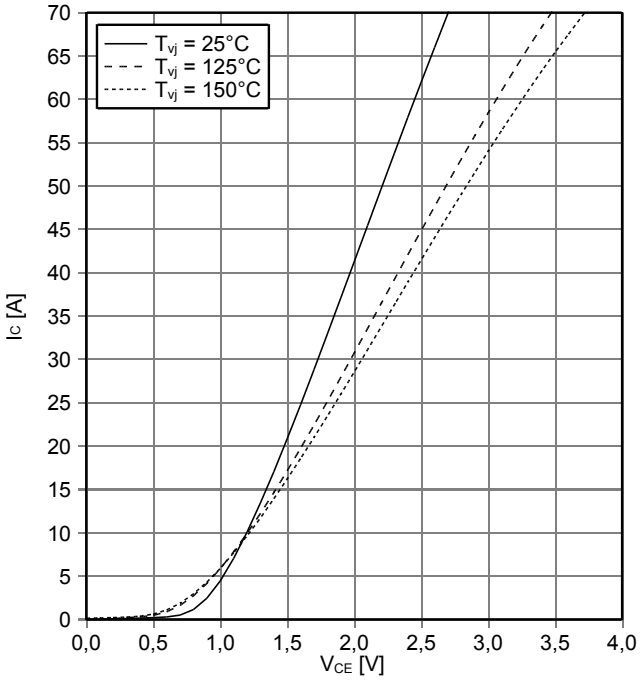
## Modul / Module

| | | | | | | |
|---|---|---|---|---|---|---|
| Isolations-Prüfspannung<br>Isolation test voltage | RMS, f = 50 Hz, t = 1 min. | $V_{ISOL}$ | | 2,5 | | kV |
| 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 | | | 12,7<br>6,3 | | mm |
| Luftstrecke<br>Clearance | Kontakt - Kühlkörper / terminal to heatsink<br>Kontakt - Kontakt / terminal to terminal | | | 8,5<br>5,0 | | mm |
| Vergleichszahl der Kriechwegbildung<br>Comperative tracking index | | CTI | | > 200 | | |
| | | | min. | typ. | max. | |
| Modulstreuinduktivität<br>Stray inductance module | | $L_{sCE}$ | | 30 | | 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>6,00 | | mΩ |
| Lagertemperatur<br>Storage temperature | | $T_{stg}$ | -40 | | 125 | °C |
| Anzugsdrehmoment f. Modulmontage<br>Mounting torque for modul mounting | Schraube M6 - Montage gem. gültiger Applikationsschrift<br>Screw M6 - Mounting according to valid application note | M | 8,00 | - | 9,00 | Nm |
| Gewicht<br>Weight | | G | | 34 | | g |

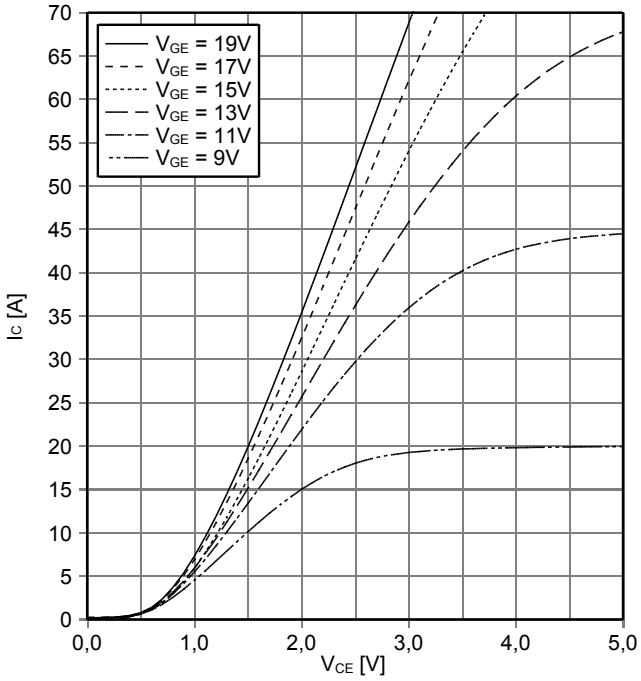
Der Strom im Dauerbetrieb ist auf 25A effektiv pro Anschlusspin begrenzt.
The current under continuous operation is limited to 25A rms per connector pin.

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

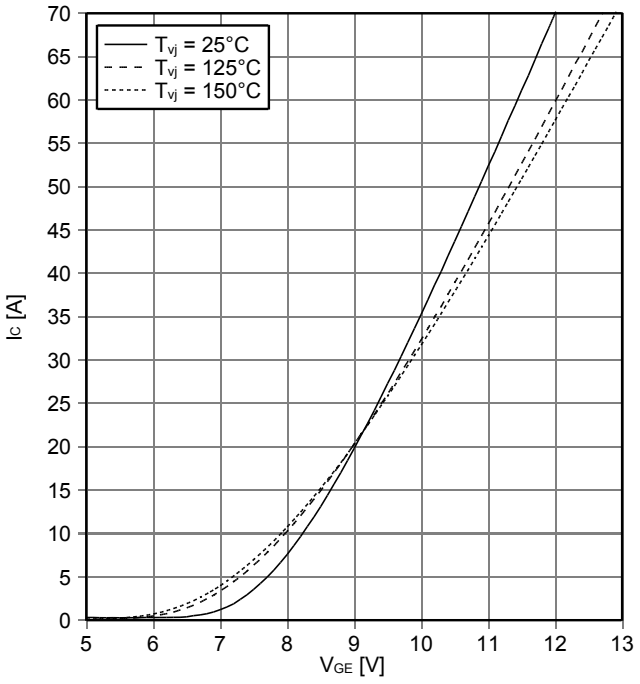
**Ausgangskennlinie IGBT,Wechselrichter (typisch)**
**output characteristic IGBT,Inverter (typical)**
$I_C = f(V_{CE})$
$V_{GE}$ = 15 V



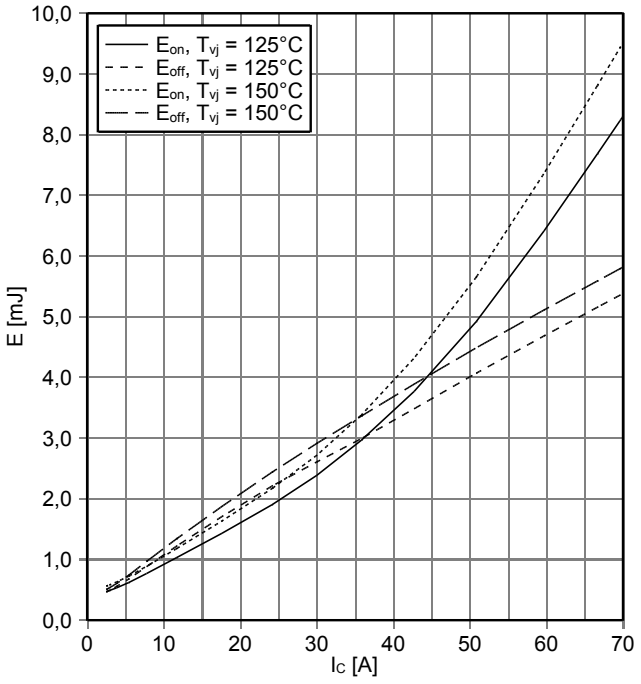

**Ausgangskennlinienfeld IGBT,Wechselrichter (typisch)**
**output characteristic IGBT,Inverter (typical)**
$I_C = f(V_{CE})$
$T_{vj}$ = 150°C




**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, $R_{Gon}$ = 12 Ω, $R_{Goff}$ = 12 Ω, $V_{CE}$ = 600 V

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**Vorläufige Daten**
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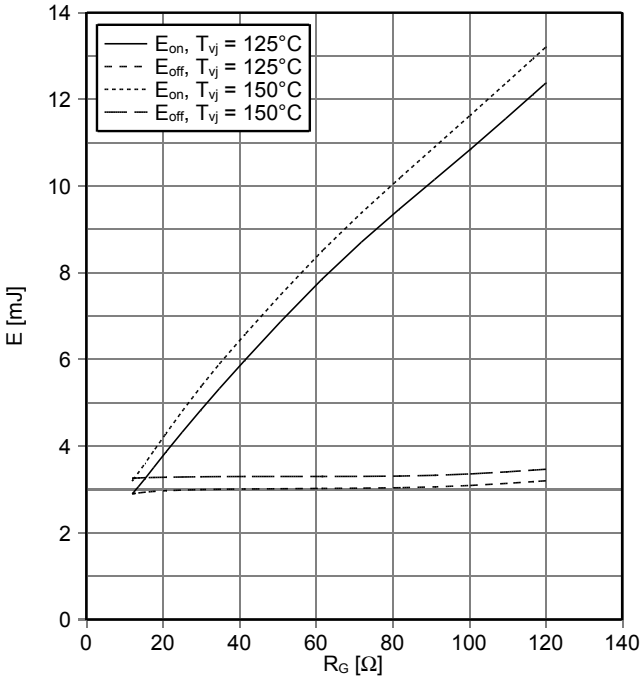
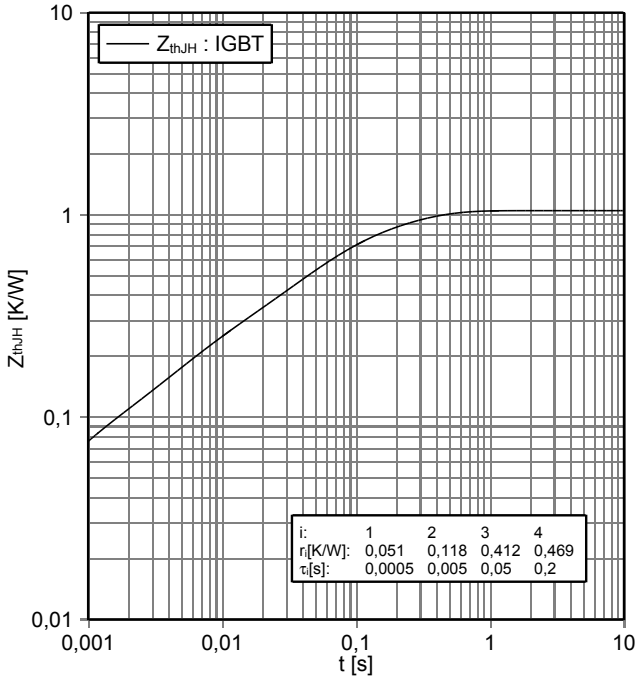
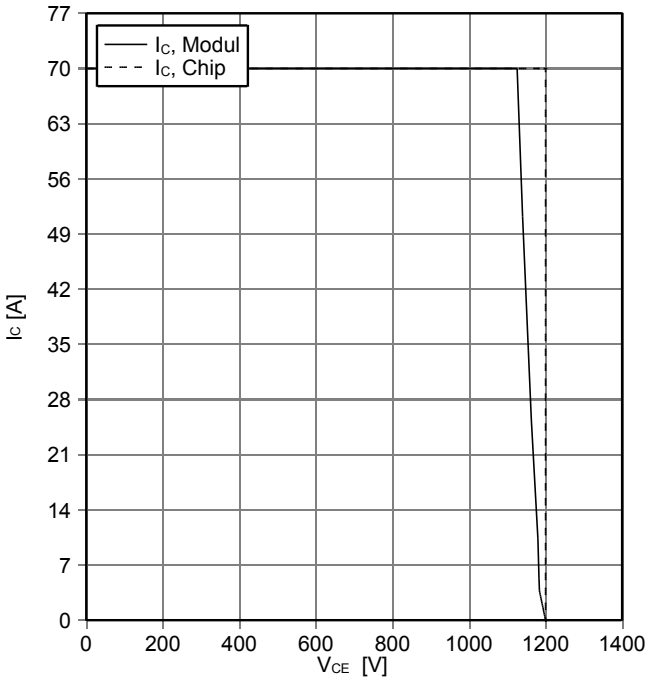
**Schaltverluste IGBT,Wechselrichter (typisch)**
**switching losses IGBT,Inverter (typical)**
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
$V_{GE}$ = ±15 V, $I_C$ = 35 A, $V_{CE}$ = 600 V



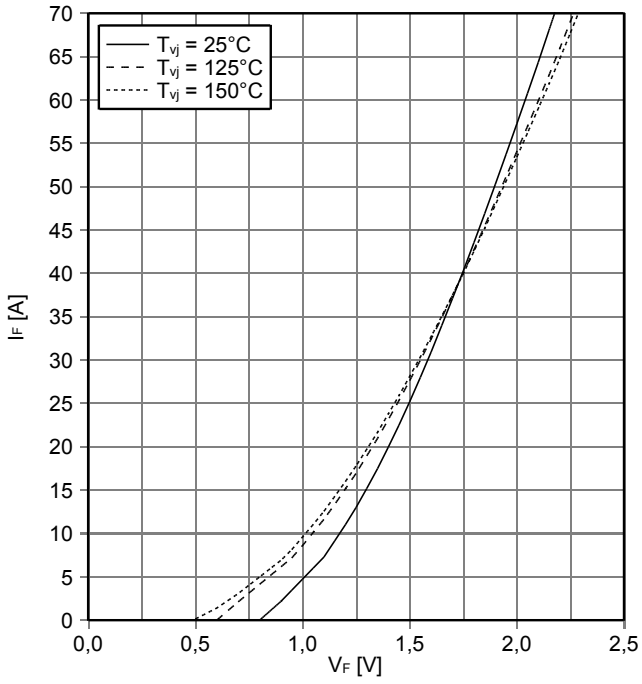

**Transienter Wärmewiderstand IGBT,Wechselrichter**
**transient thermal impedance IGBT,Inverter**
$Z_{thJH} = f(t)$




**Sicherer Rückwärts-Arbeitsbereich IGBT,Wechselrichter (RBSOA)**
**reverse bias safe operating area IGBT,Inverter (RBSOA)**
$I_C = f(V_{CE})$
$V_{GE}$ = ±15 V, $R_{Goff}$ = 12 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**
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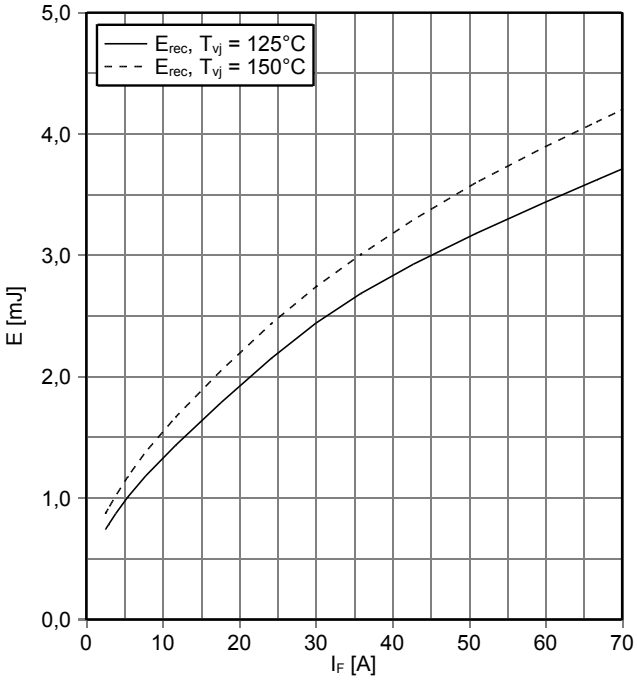
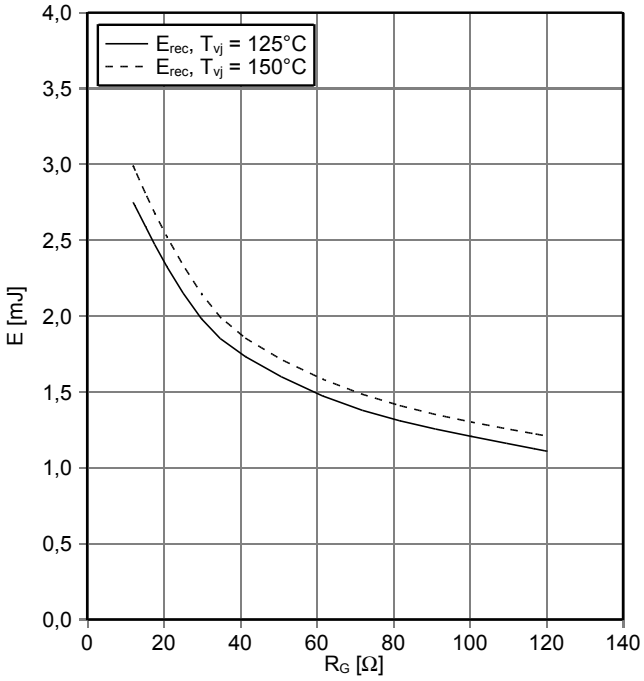
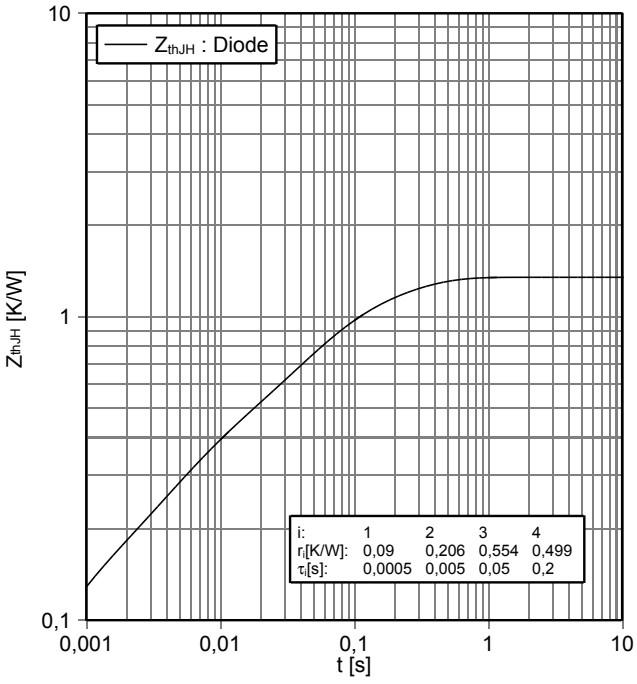
**Schaltverluste Diode, Wechselrichter (typisch)**
**switching losses Diode, Inverter (typical)**
$E_{rec} = f(I_F)$
$R_{Gon} = 12\ \Omega$, $V_{CE} = 600$ V



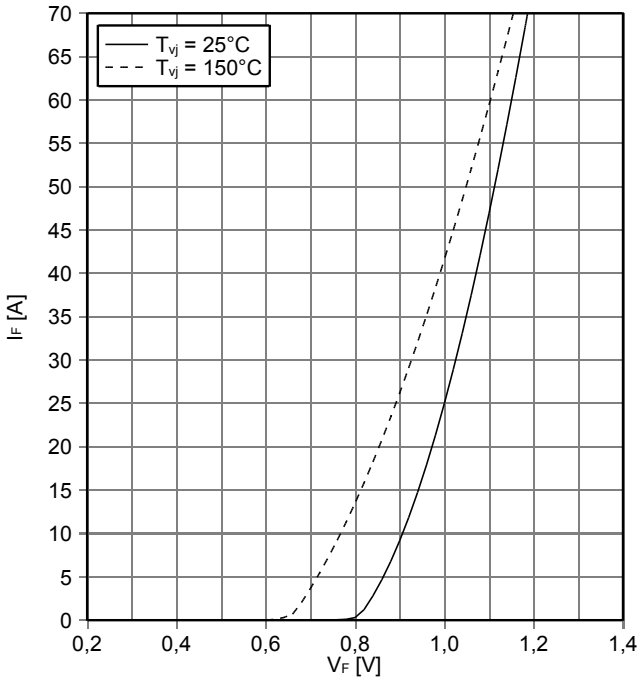

**Schaltverluste Diode, Wechselrichter (typisch)**
**switching losses Diode, Inverter (typical)**
$E_{rec} = f(R_G)$
$I_F = 35$ A, $V_{CE} = 600$ V




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




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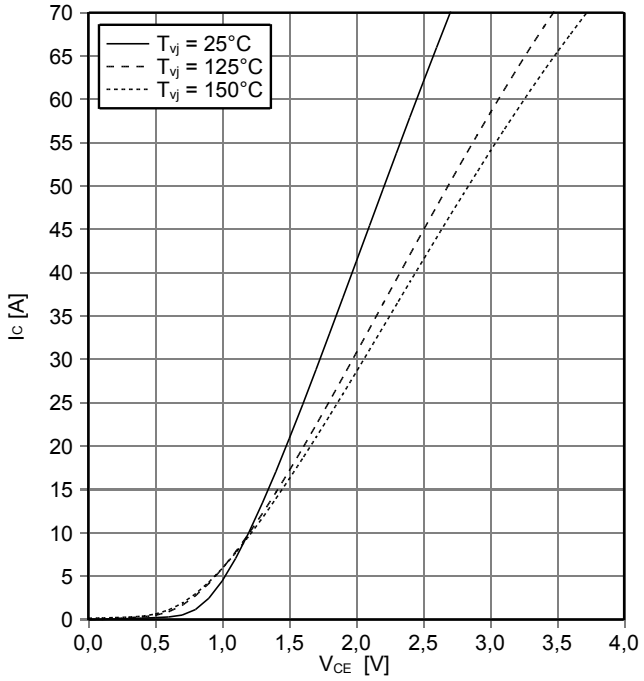
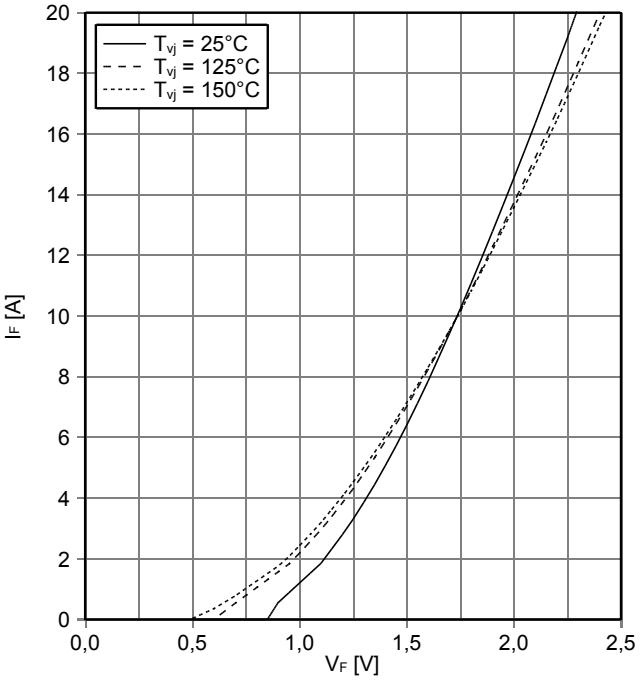
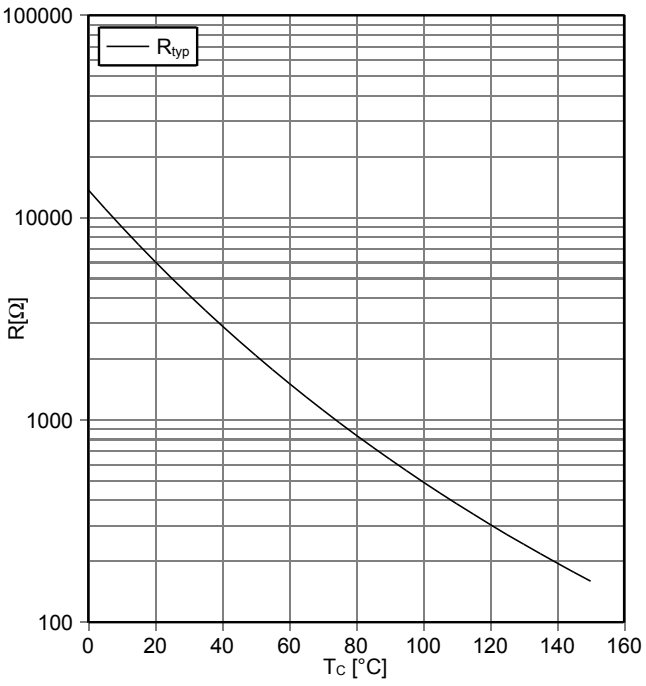
**Ausgangskennlinie IGBT, Brems-Chopper (typisch)**
**output characteristic IGBT, Brake-Chopper (typical)**
$I_C = f(V_{CE})$
$V_{GE} = 15\ V$




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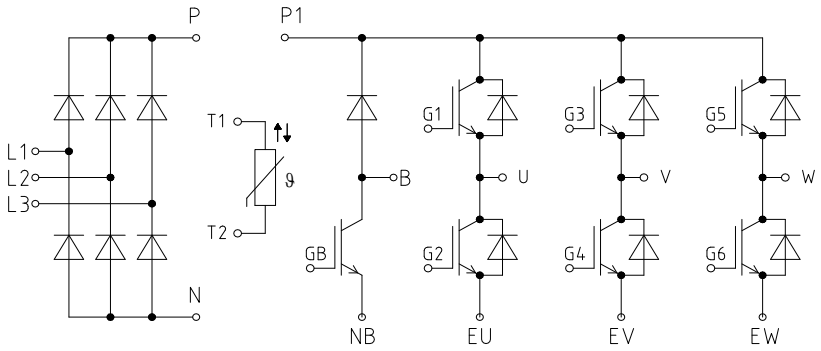
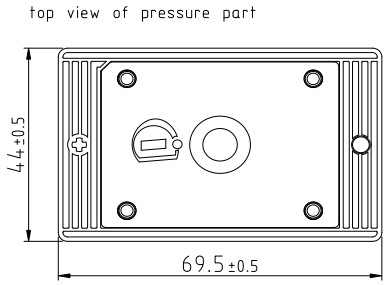
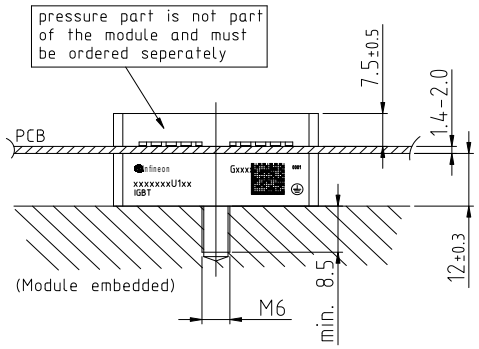
**Vorläufige Daten**
**Preliminary Data**

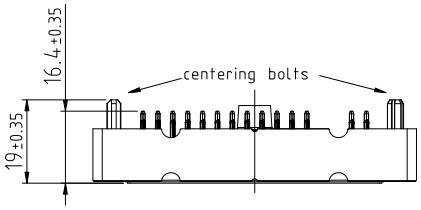
## Schaltplan / circuit_diagram_headline



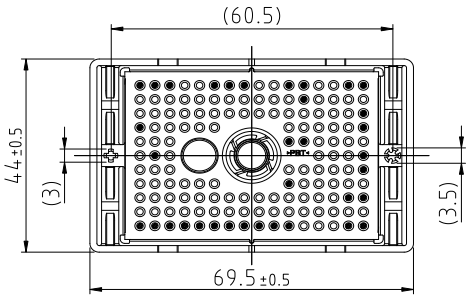

## Gehäuseabmessungen / package outlines

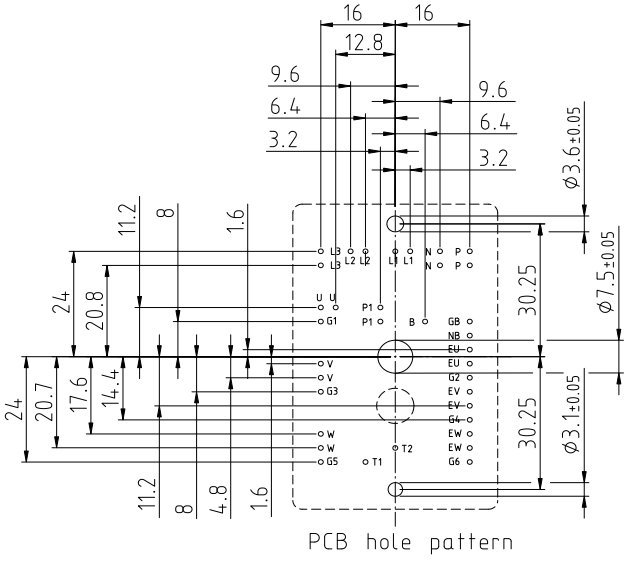



- Recomended screw:
  M6 counter sunk (acc. to ISO14581 or DIN7991)
- Pin-Grid 3.2mm
- Tolerance of PCB hole pattern ⌖ Ø0.1
- Hole specification for contacts see AN 2009-09
  Diameters of plated holes Ø 1.0mm $^{+0.09}_{-0.06}$
  Diameters of drill Ø 1.15mm

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**Vorläufige Daten**
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