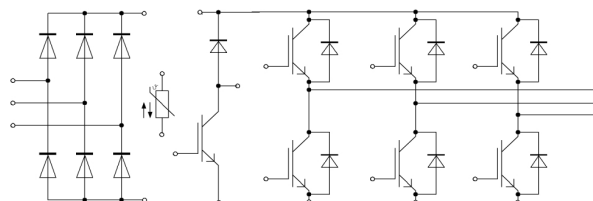


SmartPIM1 Modul mit Trench/Feldstopp IGBT4 und Emitter Controlled 4 Diode und PressFIT / NTC
SmartPIM1 module with Trench/Fieldstop IGBT4 and Emitter Controlled 4 diode and PressFIT / NTC

Vorläufige Daten / Preliminary Data



$V_{CES} = 1200V$
 $I_{C\ nom} = 25A / I_{CRM} = 50A$

Typische Anwendungen

- Hilfsumrichter
- Klimaanlage
- Motorantriebe
- Servoumrichter

Typical Applications

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

Elektrische Eigenschaften

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

Electrical Features

- Low Switching Losses
- Trench IGBT 4
- $T_{vj\ op} = 150^{\circ}C$
- 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



DMX - Code



Content of the Code

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

| | | |
|-----------------|---------------------------------|----------------------|
| prepared by: 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 Collector-emitter voltage | $T_{vj} = 25^{\circ}\text{C}$ | V_{CES} | 1200 | V |
| Kollektor-Dauergleichstrom Continuous DC collector current | $T_C = 100^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ | $I_{C\text{nom}}$ I_C | 25 39 | A A |
| Periodischer Kollektor-Spitzenstrom Repetitive peak collector current | $t_P = 1\text{ ms}$ | I_{CRM} | 50 | A |
| Gesamt-Verlustleistung Total power dissipation | $T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ | P_{tot} | 190 | W |
| Gate-Emitter-Spitzenspannung Gate-emitter peak voltage | | V_{GES} | +/-20 | V |

Charakteristische Werte / Characteristic Values

| | | | min. | typ. | max. | | |
|---|---|---|--------------------|-------------------------|------|-------------|---|
| Kollektor-Emitter-Sättigungsspannung Collector-emitter saturation voltage | $I_C = 25\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 25\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 25\text{ A}, V_{GE} = 15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | $V_{CE\text{sat}}$ | 1,85 2,15 2,25 | 2,25 | V V V | |
| Gate-Schwellenspannung Gate threshold voltage | $I_C = 0,80\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$ | | V_{GEth} | 5,2 | 5,8 | 6,4 | V |
| Gateladung Gate charge | $V_{GE} = -15\text{ V} \dots +15\text{ V}$ | | Q_G | 0,20 | | | μC |
| Interner Gatewiderstand Internal gate resistor | $T_{vj} = 25^{\circ}\text{C}$ | | R_{Gint} | 0,0 | | | Ω |
| Eingangskapazität Input capacitance | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$ | | C_{ies} | 1,45 | | | nF |
| Rückwirkungskapazität 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} | 0,05 | | | nF |
| Kollektor-Emitter-Reststrom Collector-emitter cut-off current | $V_{CE} = 1200\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$ | | I_{CES} | | | 1,0 | mA |
| Gate-Emitter-Reststrom Gate-emitter leakage current | $V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}, T_{vj} = 25^{\circ}\text{C}$ | | I_{GES} | | | 400 | nA |
| Einschaltverzögerungszeit, induktive Last Turn-on delay time, inductive load | $I_C = 25\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 20\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_{don} | 0,026 0,026 0,026 | | | μs μs μs |
| Anstiegszeit, induktive Last Rise time, inductive load | $I_C = 25\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 20\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_r | 0,016 0,02 0,021 | | | μs μs μs |
| Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load | $I_C = 25\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 20\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_{doff} | 0,19 0,28 0,30 | | | μs μs μs |
| Fallzeit, induktive Last Fall time, inductive load | $I_C = 25\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 20\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_f | 0,18 0,21 0,22 | | | μs μs μs |
| Einschaltverlustenergie pro Puls Turn-on energy loss per pulse | $I_C = 25\text{ A}, V_{CE} = 600\text{ V}, L_S = 35\text{ nH}$ $V_{GE} = \pm 15\text{ V}, di/dt = 1700\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{Gon} = 20\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{on} | 1,60 2,40 2,60 | | | mJ mJ mJ |
| Abschaltverlustenergie pro Puls Turn-off energy loss per pulse | $I_C = 25\text{ A}, V_{CE} = 600\text{ V}, L_S = 35\text{ nH}$ $V_{GE} = \pm 15\text{ V}, du/dt = 3600\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{Goff} = 20\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{off} | 1,45 2,15 2,35 | | | mJ mJ mJ |
| Kurzschlußverhalten SC data | $V_{GE} \leq 15\text{ V}, V_{CC} = 800\text{ V}$ $V_{CEmax} = V_{CES} - L_{SCE} \cdot di/dt$ $t_P \leq 10\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$ | | I_{SC} | 90 | | | A |
| Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case | pro IGBT / per IGBT | | R_{thJC} | 0,70 | 0,80 | | K/W |
| Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink | pro IGBT / per IGBT $\lambda_{\text{Paste}} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{\text{grease}} = 1\text{ W}/(\text{m}\cdot\text{K})$ | | R_{thCH} | 0,60 | | | K/W |
| Temperatur im Schaltbetrieb Temperature under switching conditions | | | $T_{vj\text{op}}$ | -40 | 150 | | $^{\circ}\text{C}$ |

| | |
|-----------------|---------------------------------|
| 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 Repetitive peak reverse voltage | $T_{vj} = 25^{\circ}\text{C}$ | V_{RRM} | 1200 | V |
| Dauergleichstrom Continuous DC forward current | | I_F | 25 | A |
| Periodischer Spitzenstrom Repetitive peak forward current | $t_P = 1\text{ ms}$ | I_{FRM} | 50 | A |
| Grenzlastintegral I^2t - value | $V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$ $V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | I^2t | 90,0 75,0 | A^2s A^2s |

Charakteristische Werte / Characteristic Values

| | | | min. | typ. | max. | |
|---|---|---|--------------------|----------------------|------|---|
| Durchlassspannung Forward voltage | $I_F = 25\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 25\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 25\text{ A}, V_{GE} = 0\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | V_F | 1,75 1,75 1,75 | 2,25 | V V V |
| Rückstromspitze Peak reverse recovery current | $I_F = 25\text{ A}, -di_F/dt = 1700\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | I_{RM} | 48,0 50,0 52,0 | | A A A |
| Sperrverzögerungsladung Recovered charge | $I_F = 25\text{ A}, -di_F/dt = 1700\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | Q_r | 2,50 4,40 4,90 | | μC μC μC |
| Abschaltenergie pro Puls Reverse recovery energy | $I_F = 25\text{ A}, -di_F/dt = 1700\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{rec} | 0,95 1,75 2,05 | | mJ mJ mJ |
| Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case | pro Diode / per diode | | R_{thJC} | 1,00 | 1,10 | K/W |
| Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink | pro Diode / per diode $\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$ | | R_{thCH} | 0,80 | | K/W |
| Temperatur im Schaltbetrieb Temperature under switching conditions | | | $T_{vj\text{ op}}$ | -40 | 150 | $^{\circ}\text{C}$ |

Diode, Gleichrichter / Diode, Rectifier

Höchstzulässige Werte / Maximum Rated Values

| | | | | |
|---|---|-------------|-------------|--|
| Periodische Spitzensperrspannung Repetitive peak reverse voltage | $T_{vj} = 25^{\circ}\text{C}$ | V_{RRM} | 1600 | V |
| Durchlassstrom Grenzeffektivwert pro Chip Maximum RMS forward current per chip | $T_C = 100^{\circ}\text{C}$ | I_{FRMSM} | 50 | A |
| Gleichrichter Ausgang Grenzeffektivstrom Maximum RMS current at rectifier output | $T_C = 100^{\circ}\text{C}$ | I_{RMSM} | 50 | A |
| Stoßstrom Grenzwert Surge forward current | $t_p = 10\text{ ms}, T_{vj} = 25^{\circ}\text{C}$ $t_p = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | I_{FSM} | 450 370 | A A |
| Grenzlastintegral I^2t - value | $t_p = 10\text{ ms}, T_{vj} = 25^{\circ}\text{C}$ $t_p = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | I^2t | 1000 685 | A^2s A^2s |

Charakteristische Werte / Characteristic Values

| | | | min. | typ. | max. | |
|---|---|-------|--------------------|------|------|--------------------|
| Durchlassspannung Forward voltage | $T_{vj} = 150^{\circ}\text{C}, I_F = 25\text{ A}$ | V_F | | 0,90 | | V |
| Sperrstrom Reverse current | $T_{vj} = 150^{\circ}\text{C}, V_R = 1600\text{ V}$ | I_R | | 1,00 | | mA |
| Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case | pro Diode / per diode | | R_{thJC} | 0,95 | 1,05 | K/W |
| Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink | pro Diode / per diode $\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$ | | R_{thCH} | 0,85 | | K/W |
| Temperatur im Schaltbetrieb Temperature under switching conditions | | | $T_{vj\text{ op}}$ | | | $^{\circ}\text{C}$ |

| | |
|-----------------|---------------------------------|
| 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 Collector-emitter voltage | $T_{vj} = 25^{\circ}\text{C}$ | V_{CES} | 1200 | V |
| Kollektor-Dauergleichstrom Continuous DC collector current | $T_C = 100^{\circ}\text{C}, T_{vj\text{ max}} = 175^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}, T_{vj\text{ max}} = 175^{\circ}\text{C}$ | $I_{C\text{ nom}}$ I_C | 25 39 | A A |
| Periodischer Kollektor-Spitzenstrom Repetitive peak collector current | $t_P = 1\text{ ms}$ | I_{CRM} | 50 | A |
| Gesamt-Verlustleistung Total power dissipation | $T_C = 25^{\circ}\text{C}, T_{vj\text{ max}} = 175^{\circ}\text{C}$ | P_{tot} | 190 | W |
| Gate-Emitter-Spitzenspannung Gate-emitter peak voltage | | V_{GES} | +/-20 | V |

Charakteristische Werte / Characteristic Values

| | | | min. | typ. | max. | | |
|---|--|---|---------------------|-------------------------|------|-------------|---|
| Kollektor-Emitter-Sättigungsspannung Collector-emitter saturation voltage | $I_C = 25\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 25\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 25\text{ A}, V_{GE} = 15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | $V_{CE\text{ sat}}$ | 1,85 2,15 2,25 | 2,25 | V V V | |
| Gate-Schwellenspannung Gate threshold voltage | $I_C = 0,80\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$ | | V_{GEth} | 5,2 | 5,8 | 6,4 | V |
| Gateladung Gate charge | $V_{GE} = -15\text{ V} \dots +15\text{ V}$ | | Q_G | 0,20 | | | μC |
| Interner Gatewiderstand Internal gate resistor | $T_{vj} = 25^{\circ}\text{C}$ | | R_{Gint} | 0,0 | | | Ω |
| Eingangskapazität Input capacitance | $f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$ | | C_{ies} | 1,45 | | | nF |
| Rückwirkungskapazität 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} | 0,05 | | | nF |
| Kollektor-Emitter-Reststrom Collector-emitter cut-off current | $V_{CE} = 1200\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$ | | I_{CES} | | | 1,0 | mA |
| Gate-Emitter-Reststrom Gate-emitter leakage current | $V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}, T_{vj} = 25^{\circ}\text{C}$ | | I_{GES} | | | 400 | nA |
| Einschaltverzögerungszeit, induktive Last Turn-on delay time, inductive load | $I_C = 25\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 68\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_{don} | 0,08 0,08 0,08 | | | μs μs μs |
| Anstiegszeit, induktive Last Rise time, inductive load | $I_C = 25\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 68\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_r | 0,042 0,051 0,053 | | | μs μs μs |
| Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load | $I_C = 25\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 68\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_{doff} | 0,34 0,44 0,46 | | | μs μs μs |
| Fallzeit, induktive Last Fall time, inductive load | $I_C = 25\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 68\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_f | 0,18 0,215 0,225 | | | μs μs μs |
| Einschaltverlustenergie pro Puls Turn-on energy loss per pulse | $I_C = 25\text{ A}, V_{CE} = 600\text{ V}, L_S = 35\text{ nH}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 68\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{on} | 3,90 5,00 5,40 | | | mJ mJ mJ |
| Abschaltverlustenergie pro Puls Turn-off energy loss per pulse | $I_C = 25\text{ A}, V_{CE} = 600\text{ V}, L_S = 35\text{ nH}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 68\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{off} | 1,50 2,20 2,40 | | | mJ mJ mJ |
| Kurzschlußverhalten SC data | $V_{GE} \leq 15\text{ V}, V_{CC} = 800\text{ V}$ $V_{CEmax} = V_{CES} - L_{SCE} \cdot di/dt$ $t_P \leq 10\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$ | | I_{SC} | 90 | | | A |
| Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case | pro IGBT / per IGBT | | R_{thJC} | 0,70 | 0,80 | | K/W |
| Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink | pro IGBT / per IGBT $\lambda_{Paste} = 1\text{ W/(m}\cdot\text{K)} / \lambda_{grease} = 1\text{ W/(m}\cdot\text{K)}$ | | R_{thCH} | 0,60 | | | K/W |
| Temperatur im Schaltbetrieb Temperature under switching conditions | | | $T_{vj\text{ op}}$ | -40 | 150 | | $^{\circ}\text{C}$ |

| | |
|-----------------|---------------------------------|
| prepared by: DK | date of publication: 2013-11-05 |
| approved by: MB | revision: 2.0 |

**Vorläufige Daten
Preliminary Data**

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

| | | | | |
|---|--|-----------|--------------|--|
| Periodische Spitzensperrspannung Repetitive peak reverse voltage | $T_{vj} = 25^{\circ}\text{C}$ | V_{RRM} | 1200 | V |
| Dauergleichstrom Continuous DC forward current | | I_F | 10 | A |
| Periodischer Spitzenstrom Repetitive peak forward current | $t_P = 1\text{ ms}$ | I_{FRM} | 20 | A |
| Grenzlastintegral I^2t - value | $V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$ $V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$ | I^2t | 16,0 14,0 | A^2s A^2s |

Charakteristische Werte / Characteristic Values

| | | | min. | typ. | max. | |
|---|---|--------------------------------|------|------|------|--------------------|
| Durchlassspannung Forward voltage | $I_F = 10\text{ A}, V_{GE} = 0\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ | | 1,75 | 2,25 | V |
| | $I_F = 10\text{ A}, V_{GE} = 0\text{ V}$ | $T_{vj} = 125^{\circ}\text{C}$ | | 1,75 | | V |
| | $I_F = 10\text{ A}, V_{GE} = 0\text{ V}$ | $T_{vj} = 150^{\circ}\text{C}$ | | 1,75 | | V |
| Rückstromspitze Peak reverse recovery current | $I_F = 10\text{ A}, -di_F/dt = 500\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ | | 12,0 | | A |
| | | $T_{vj} = 125^{\circ}\text{C}$ | | 10,0 | | A |
| | | $T_{vj} = 150^{\circ}\text{C}$ | | 8,00 | | A |
| Sperrverzögerungsladung Recovered charge | $I_F = 10\text{ A}, -di_F/dt = 500\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ | | 0,90 | | μC |
| | | $T_{vj} = 125^{\circ}\text{C}$ | | 1,70 | | μC |
| | | $T_{vj} = 150^{\circ}\text{C}$ | | 1,90 | | μC |
| Abschaltenergie pro Puls Reverse recovery energy | $I_F = 10\text{ A}, -di_F/dt = 500\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ | | 0,24 | | mJ |
| | | $T_{vj} = 125^{\circ}\text{C}$ | | 0,52 | | mJ |
| | | $T_{vj} = 150^{\circ}\text{C}$ | | 0,59 | | mJ |
| Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case | pro Diode / per diode | R_{thJC} | | 1,50 | 1,65 | K/W |
| Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink | pro Diode / per diode $\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$ | R_{thCH} | | 1,20 | | K/W |
| Temperatur im Schaltbetrieb Temperature under switching conditions | | $T_{vj\text{ op}}$ | -40 | | 150 | $^{\circ}\text{C}$ |

NTC-Widerstand / NTC-Thermistor

Charakteristische Werte / Characteristic Values

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

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

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

Modul / Module

| | | | | | |
|---|--|--|--------------------------------|--------------|---------|
| Isolations-Prüfspannung Isolation test voltage | RMS, f = 50 Hz, t = 1 min. | V _{ISOL} | 2,5 | | kV |
| Innere Isolation Internal isolation | Basisisolation (Schutzklasse 1, EN61140) basic insulation (class 1, IEC 61140) | | Al ₂ O ₃ | | |
| Kriechstrecke Creepage distance | Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal | | 12,7 6,3 | | mm |
| Luftstrecke Clearance | Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal | | 8,5 5,0 | | mm |
| Vergleichszahl der Kriechwegbildung Comperative tracking index | | CTI | > 200 | | |
| | | | min. | typ. | max. |
| Modulstreuinduktivität Stray inductance module | | L _{SCE} | | 30 | nH |
| Modulleitungswiderstand, Anschlüsse - Chip Module lead resistance, terminals - chip | T _c = 25°C, pro Schalter / per switch | R _{CC'+EE'} R _{AA'+CC'} | | 4,00 6,00 | mΩ |
| Lagertemperatur Storage temperature | | T _{stg} | -40 | | 125 °C |
| Anzugsdrehmoment f. Modulmontage Mounting torque for modul mounting | Schraube M6 - Montage gem. gültiger Applikationsschrift Screw M6 - Mounting according to valid application note | M | 8,00 | - | 9,00 Nm |
| Gewicht Weight | | G | | 34 | g |

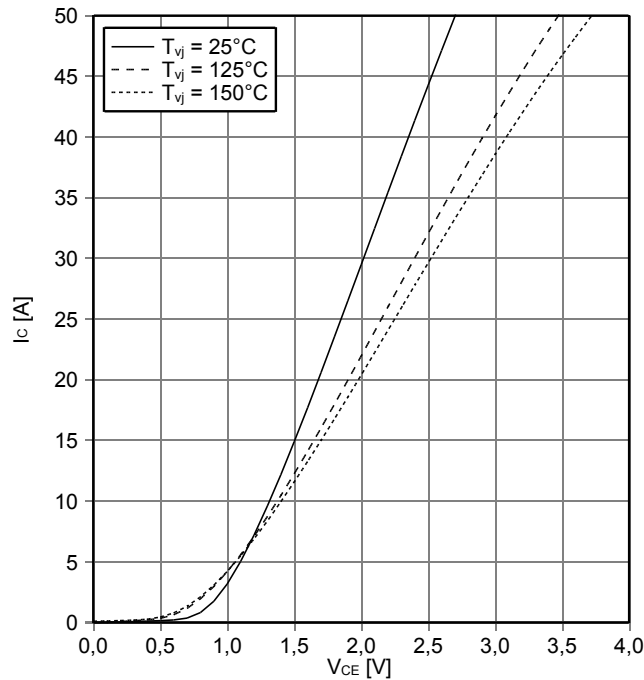
Der Strom im Dauerbetrieb ist auf 25A effektiv pro Anschlusspin begrenzt.
The current under continuous operation is limited to 25A rms per connector pin.

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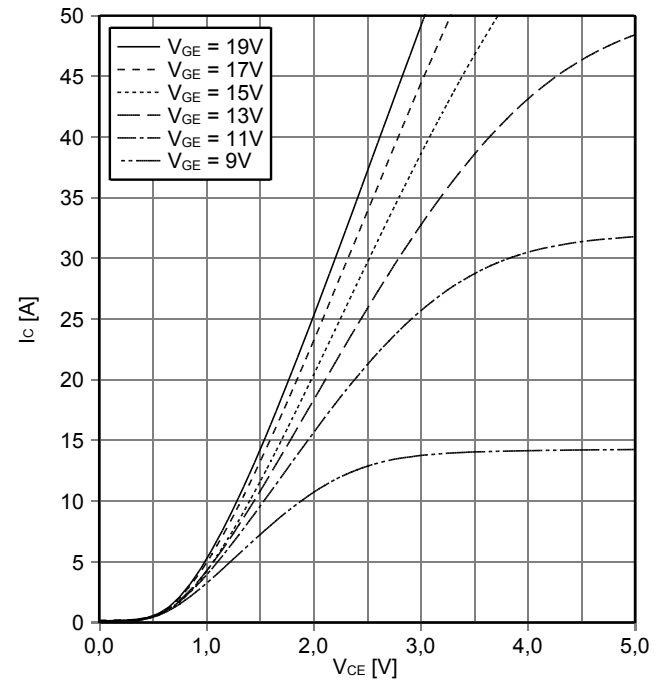
Ausgangskennlinie IGBT, Wechselrichter (typisch)
output characteristic IGBT, Inverter (typical)

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



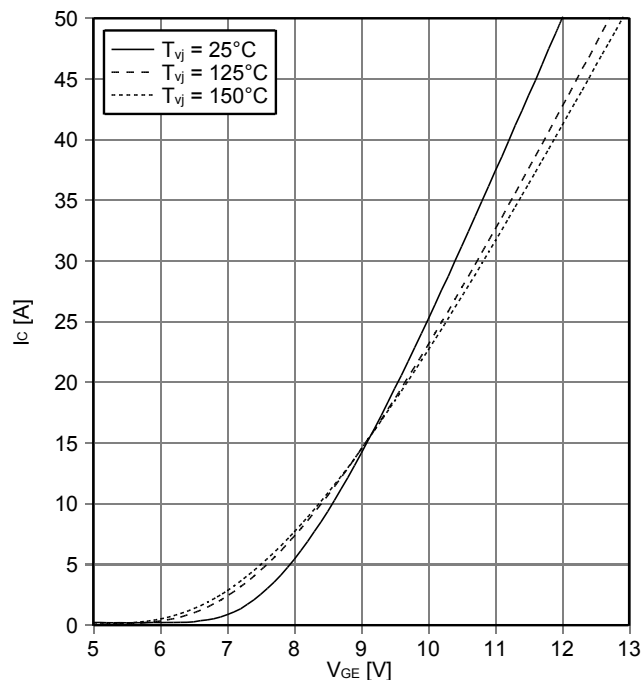
Ausgangskennlinienfeld IGBT, Wechselrichter (typisch)
output characteristic IGBT, Inverter (typical)

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



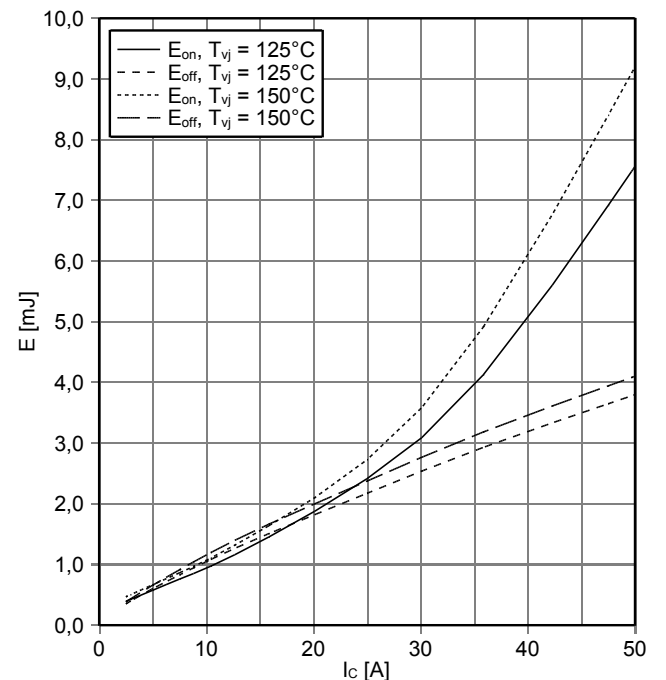
Übertragungscharakteristik IGBT, Wechselrichter (typisch)
transfer characteristic IGBT, Inverter (typical)

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



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

$E_{on} = f(I_C), E_{off} = f(I_C)$
 $V_{GE} = \pm 15\text{ V}, R_{Gon} = 20\ \Omega, R_{Goff} = 20\ \Omega, V_{CE} = 600\text{ V}$



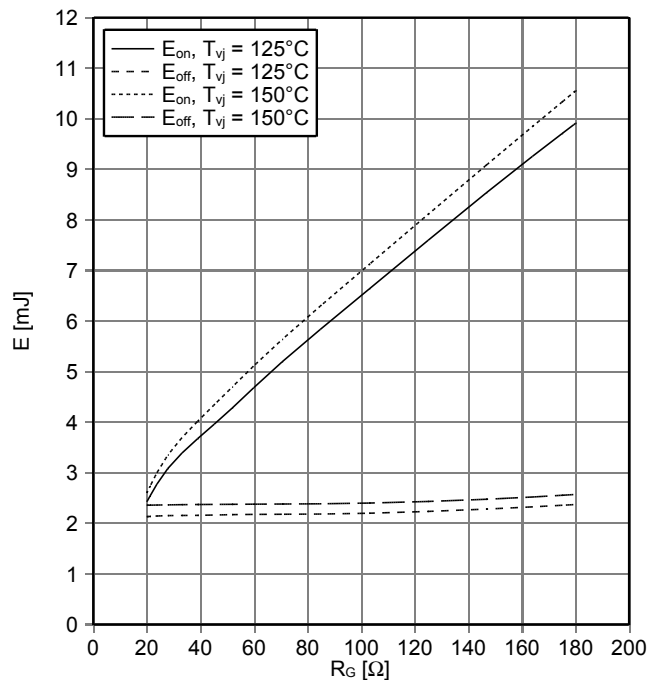
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Preliminary Data

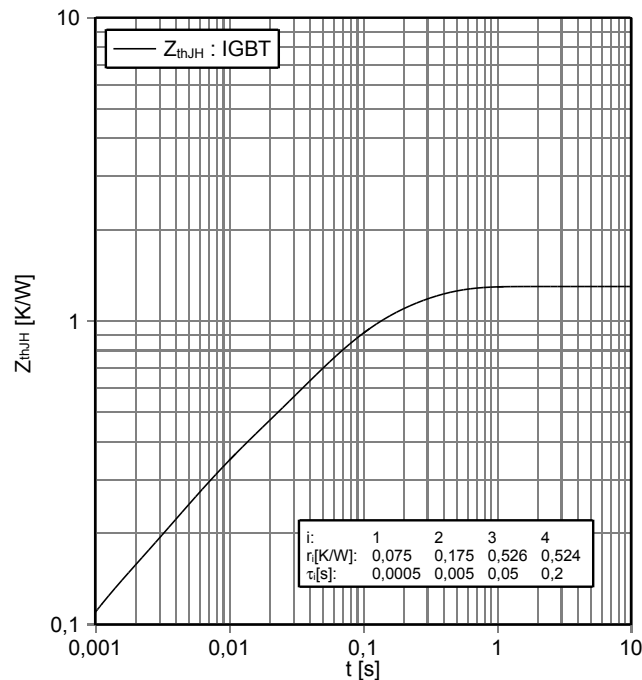
Schaltverluste IGBT, Wechselrichter (typisch)
switching losses IGBT, Inverter (typical)

$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
 $V_{GE} = \pm 15\text{ V}$, $I_C = 25\text{ A}$, $V_{CE} = 600\text{ V}$



Transienter Wärmewiderstand IGBT, Wechselrichter
transient thermal impedance IGBT, Inverter

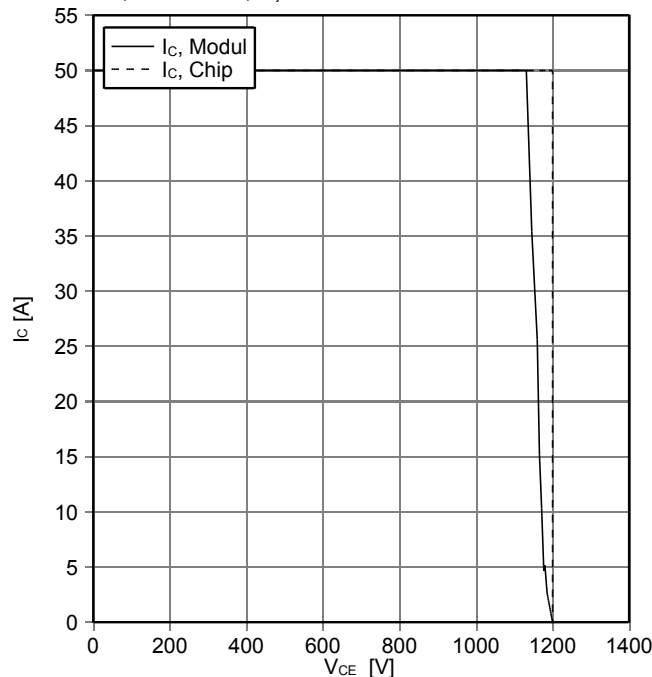
$Z_{thJH} = f(t)$



Sicherer Rückwärts-Arbeitsbereich IGBT, Wechselrichter
(RBSOA)

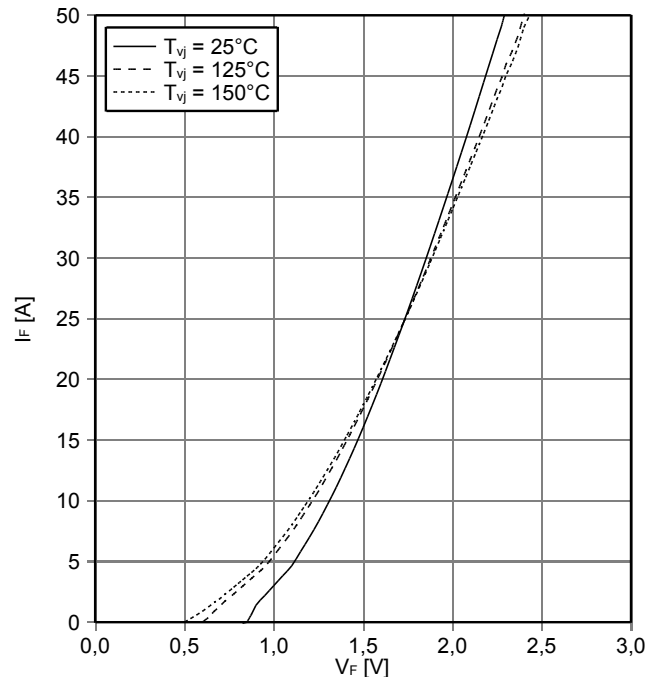
reverse bias safe operating area IGBT, Inverter (RBSOA)

$I_C = f(V_{CE})$
 $V_{GE} = \pm 15\text{ V}$, $R_{Goff} = 20\ \Omega$, $T_{vj} = 150^\circ\text{C}$



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

$I_F = f(V_F)$



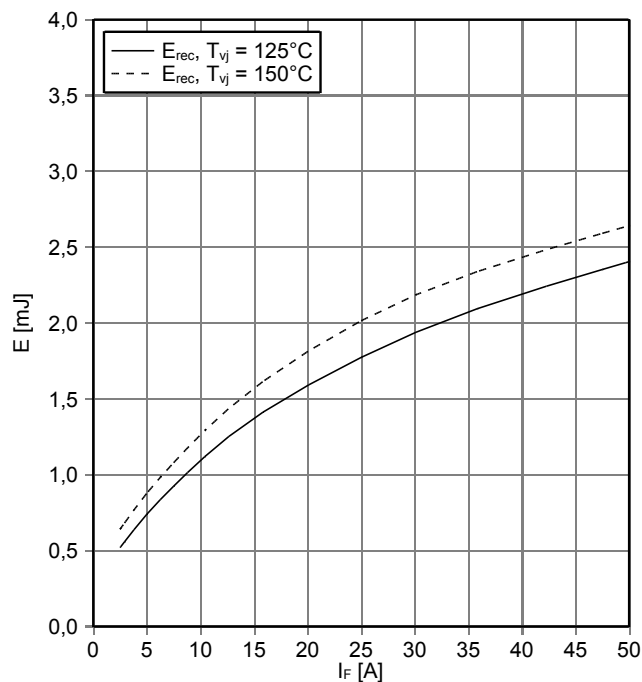
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**Vorläufige Daten
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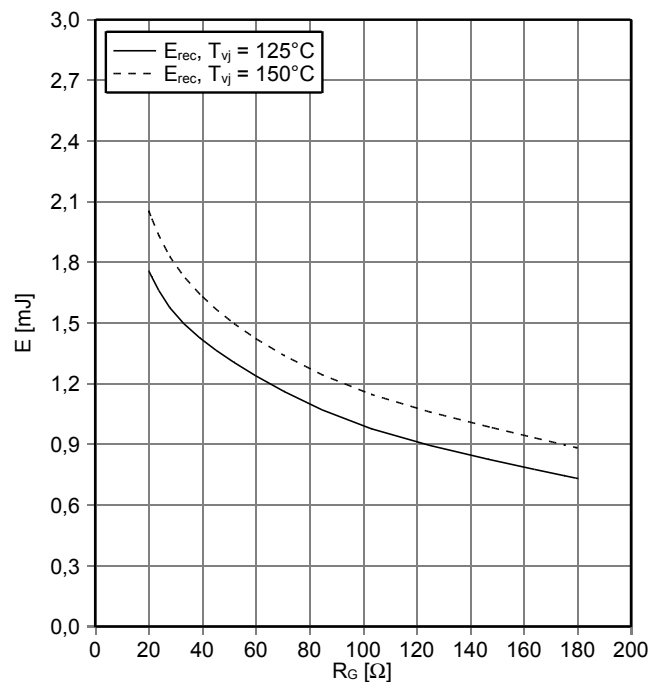
**Schaltverluste Diode, Wechselrichter (typisch)
switching losses Diode, Inverter (typical)**

$E_{rec} = f(I_F)$
 $R_{Gon} = 20 \Omega, V_{CE} = 600 V$



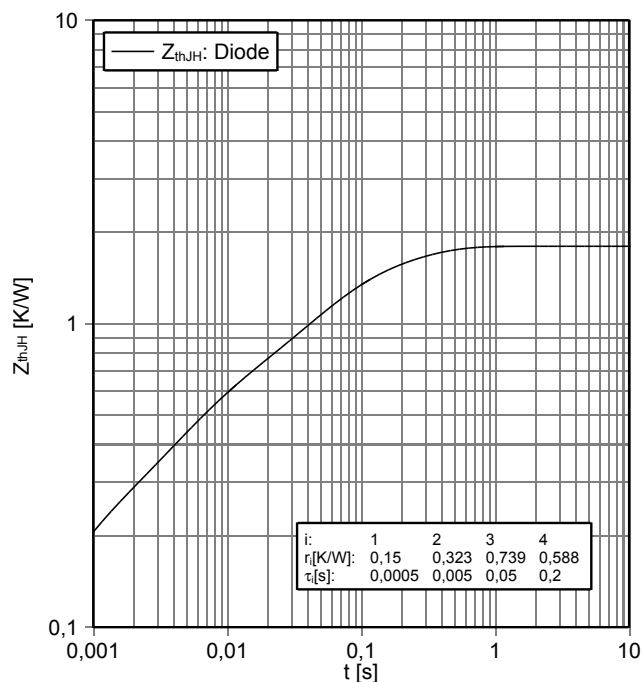
**Schaltverluste Diode, Wechselrichter (typisch)
switching losses Diode, Inverter (typical)**

$E_{rec} = f(R_G)$
 $I_F = 25 A, V_{CE} = 600 V$



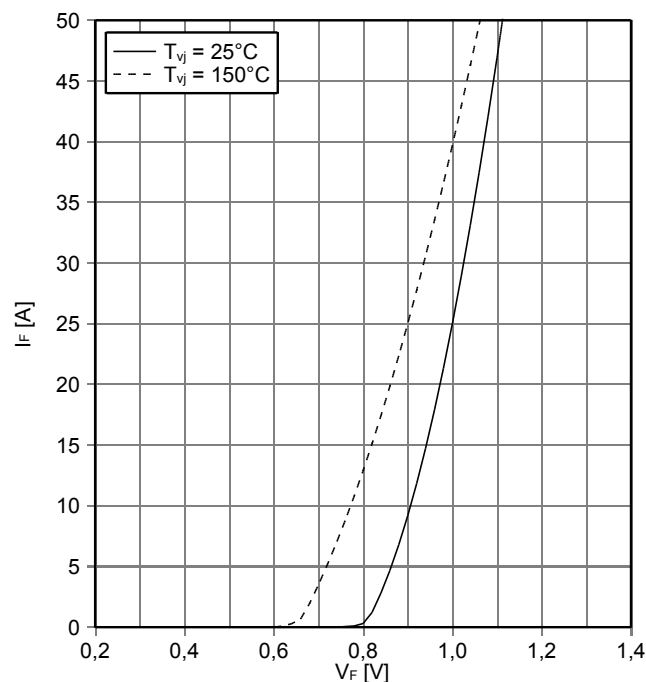
**Transienter Wärmewiderstand Diode, Wechselrichter
transient thermal impedance Diode, Inverter**

$Z_{thJH} = f(t)$



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

$I_F = f(V_F)$



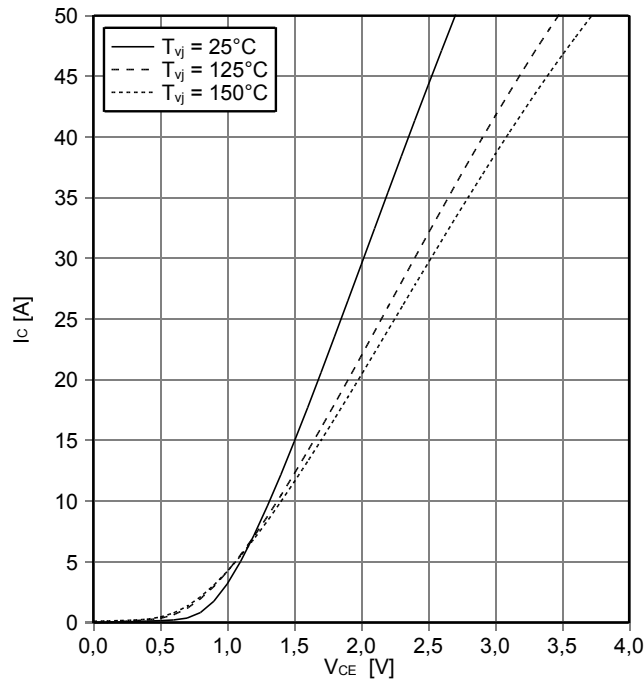
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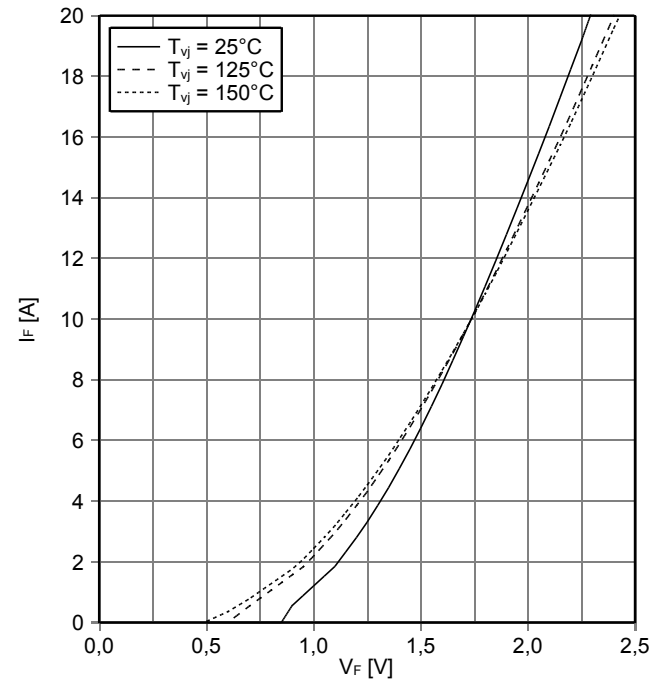
**Ausgangskennlinie IGBT, Brems-Chopper (typisch)
output characteristic IGBT, Brake-Chopper (typical)**

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



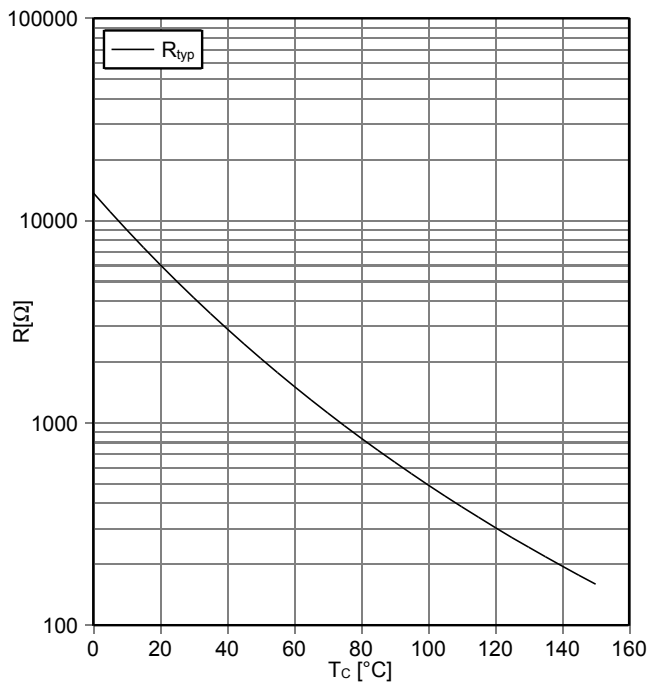
**Durchlasskennlinie der Diode, Brems-Chopper (typisch)
forward characteristic of Diode, Brake-Chopper (typical)**

$I_F = f(V_F)$



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

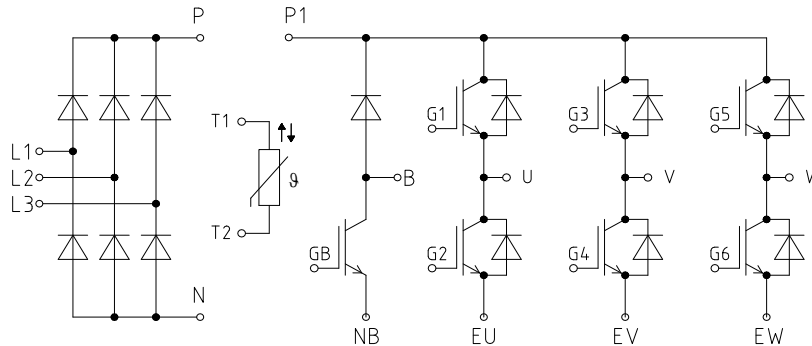
$R = f(T)$



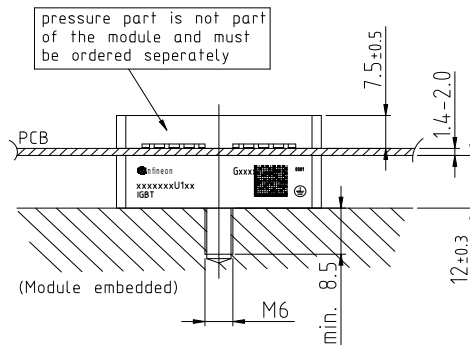
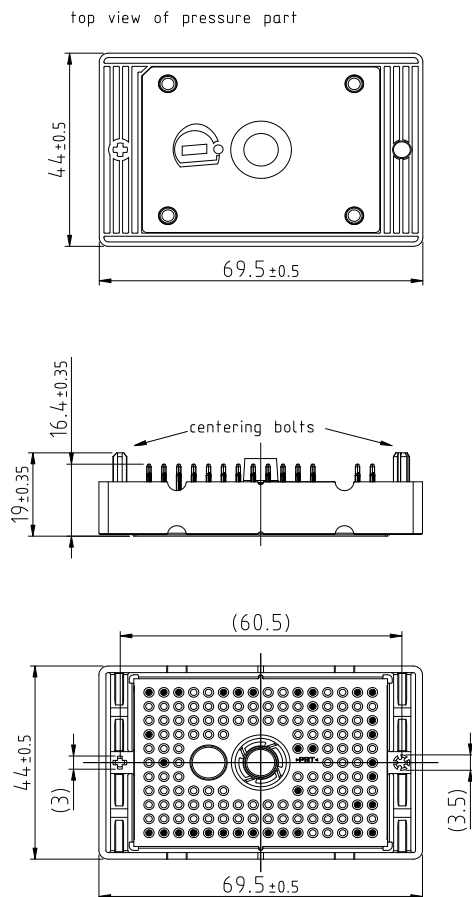
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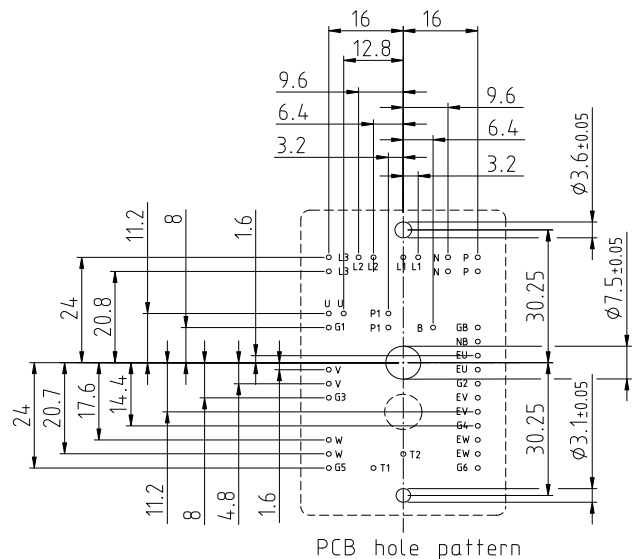
Schaltplan / circuit_diagram_headline



Gehäuseabmessungen / package outlines



- Recommended screw: M6 counter sunk (acc. to ISO14581 or DIN7991)
- Pin-Grid 3.2mm
- Tolerance of PCB hole pattern $\pm \phi 0.1$
- Hole specification for contacts see AN 2009-09
 Diameters of plated holes $\phi 1.0\text{mm} \begin{matrix} +0.09 \\ -0.06 \end{matrix}$
 Diameters of drill $\phi 1.15\text{mm}$



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