

Technische Information / technical information

IGBT-Module
IGBT-modules

FP50R12KT4



EconoPIM™2 Modul mit Trench/Feldstopp IGBT4 und EmCon4 Diode
EconoPIM™2 module with trench/fieldstop IGBT4 and EmCon4 diode

IGBT-Wechselrichter / IGBT-inverter

Vorläufige Daten / preliminary data

Höchstzulässige Werte / maximum rated values

| | | | | |
|--|--|--------------------|-------|---|
| Kollektor-Emitter-Sperrspannung collector-emitter voltage | $T_{vj} = 25^{\circ}\text{C}$ | V_{CES} | 1200 | V |
| Kollektor-Dauergleichstrom DC-collector current | $T_C = 95^{\circ}\text{C}, T_{vj} = 175^{\circ}\text{C}$ | $I_{C\text{ nom}}$ | 50 | A |
| Periodischer Kollektor Spitzenstrom repetitive peak collector current | $t_p = 1\text{ ms}$ | I_{CRM} | 100 | A |
| Gesamt-Verlustleistung total power dissipation | $T_C = 25^{\circ}\text{C}, T_{vj} = 175^{\circ}\text{C}$ | P_{tot} | 280 | 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 | $I_C = 50\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 50\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 50\text{ A}, V_{GE} = 15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | $V_{CE\text{ sat}}$ | 1,85 2,15 2,25 | 2,25 | V V V | |
| Gate-Schwellenspannung gate threshold voltage | $I_C = 1,70\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$ | | V_{GEth} | 5,2 | 5,8 | 6,4 | V |
| Gateladung gate charge | $V_{GE} = -15\text{ V} \dots +15\text{ V}$ | | Q_G | 0,38 | | | μC |
| Interner Gatewiderstand internal gate resistor | $T_{vj} = 25^{\circ}\text{C}$ | | R_{Gint} | 4,0 | | | 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} | 2,80 | | | 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} | 0,10 | | | 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} | | | 100 | nA |
| Einschaltverzögerungszeit (ind. Last) turn-on delay time (inductive load) | $I_C = 50\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 15\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | $t_{d\text{ on}}$ | 0,16 0,17 0,17 | | | μs μs μs |
| Anstiegszeit (induktive Last) rise time (inductive load) | $I_C = 50\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 15\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_r | 0,03 0,04 0,04 | | | μs μs μs |
| Abschaltverzögerungszeit (ind. Last) turn-off delay time (inductive load) | $I_C = 50\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 15\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | $t_{d\text{ off}}$ | 0,33 0,43 0,45 | | | μs μs μs |
| Fallzeit (induktive Last) fall time (inductive load) | $I_C = 50\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 15\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_f | 0,08 0,15 0,17 | | | μs μs μs |
| Einschaltverlustenergie pro Puls turn-on energy loss per pulse | $I_C = 50\text{ A}, V_{CE} = 600\text{ V}, L_S = 20\text{ nH}$ $V_{GE} = \pm 15\text{ V}, di/dt = 1400\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $R_{Gon} = 15\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{on} | 5,70 7,70 8,40 | | | mJ mJ mJ |
| Abschaltverlustenergie pro Puls turn-off energy loss per pulse | $I_C = 50\text{ A}, V_{CE} = 600\text{ V}, L_S = 20\text{ nH}$ $V_{GE} = \pm 15\text{ V}, du/dt = 3600\text{ V}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $R_{Goff} = 15\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{off} | 2,80 4,30 4,80 | | | mJ mJ mJ |
| Kurzschlussverhalten SC data | $V_{GE} \leq 15\text{ V}, V_{CC} = 900\text{ V}$ $V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$ | $t_p \leq 10\ \mu\text{s}, T_{vj} = 125^{\circ}\text{C}$ | I_{SC} | 180 | | | A |
| Innerer Wärmewiderstand thermal resistance, junction to case | pro IGBT / per IGBT | | R_{thJC} | | | 0,54 | K/W |
| Übergangs-Wärmewiderstand thermal resistance, case to heatsink | pro IGBT / per IGBT $\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$ | | R_{thCH} | 0,295 | | | K/W |

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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 DC forward current | | I_F | 50 | A |
| Periodischer Spitzenstrom repetitive peak forward current | $t_p = 1\text{ ms}$ | I_{FRM} | 100 | A |
| Grenzlastintegral I^2t - value | $V_R = 0\text{ V}, t_p = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$ | I^2t | 560 | A^2s |

Charakteristische Werte / characteristic values

| | | | min. | typ. | max. | |
|---|---|--------------------------------|------|------|------|---------------|
| Durchlassspannung forward voltage | $I_F = 50\text{ A}, V_{GE} = 0\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ | | 1,70 | 2,15 | V |
| | $I_F = 50\text{ A}, V_{GE} = 0\text{ V}$ | $T_{vj} = 125^{\circ}\text{C}$ | | 1,65 | | V |
| | $I_F = 50\text{ A}, V_{GE} = 0\text{ V}$ | $T_{vj} = 150^{\circ}\text{C}$ | | 1,65 | | V |
| Rückstromspitze peak reverse recovery current | $I_F = 50\text{ A}, -di_F/dt = 1400\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ | | 54,0 | | A |
| | | $T_{vj} = 125^{\circ}\text{C}$ | | 60,0 | | A |
| | | $T_{vj} = 150^{\circ}\text{C}$ | | 63,0 | | A |
| Sperrverzögerungsladung recovered charge | $I_F = 50\text{ A}, -di_F/dt = 1400\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ | | 5,50 | | μC |
| | | $T_{vj} = 125^{\circ}\text{C}$ | | 8,80 | | μC |
| | | $T_{vj} = 150^{\circ}\text{C}$ | | 10,0 | | μC |
| Abschaltenergie pro Puls reverse recovery energy | $I_F = 50\text{ A}, -di_F/dt = 1400\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ | | 1,70 | | mJ |
| | | $T_{vj} = 125^{\circ}\text{C}$ | | 3,00 | | mJ |
| | | $T_{vj} = 150^{\circ}\text{C}$ | | 3,70 | | mJ |
| Innerer Wärmewiderstand thermal resistance, junction to case | pro Diode / per diode | R_{thJC} | | | 0,81 | K/W |
| Übergangs-Wärmewiderstand 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} | | 0,44 | | K/W |

Diode-Gleichrichter / diode-rectifier

Höchstzulässige Werte / maximum rated values

| | | | | |
|---|---|-------------|-------------|--|
| Periodische Rückw. Spitzensperrspannung repetitive peak reverse voltage | $T_{vj} = 25^{\circ}\text{C}$ | V_{RRM} | 1600 | V |
| Durchlassstrom Grenzeffektivwert pro Dio. forward current RMS maximum per diode | $T_C = 80^{\circ}\text{C}$ | I_{FRMSM} | 70 | A |
| Gleichrichter Ausgang Grenzeffektivstrom maximum RMS current at Rectifier output | $T_C = 80^{\circ}\text{C}$ | I_{RMSM} | 80 | 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 | A |
| | | | 370 | 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 | $T_{vj} = 150^{\circ}\text{C}, I_F = 50\text{ A}$ | V_F | | 1,05 | | V |
| Sperrstrom reverse current | $T_{vj} = 150^{\circ}\text{C}, V_R = 1600\text{ V}$ | I_R | | 1,00 | | mA |
| Innerer Wärmewiderstand thermal resistance, junction to case | pro Diode per diode | R_{thJC} | | | 0,85 | K/W |
| Übergangs-Wärmewiderstand 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} | | 0,465 | | K/W |

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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 DC-collector current | $T_C = 100^{\circ}\text{C}, T_{vj} = 175^{\circ}\text{C}$ | I_{Cnom} | 25 | A |
| Periodischer Kollektor Spitzenstrom repetitive peak collector current | $t_p = 1 \text{ ms}$ | I_{CRM} | 50 | A |
| Gesamt-Verlustleistung total power dissipation | $T_C = 25^{\circ}\text{C}, T_{vj} = 175^{\circ}\text{C}$ | P_{tot} | 160 | 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 | $I_C = 25 \text{ A}, V_{GE} = 15 \text{ V}$ $I_C = 25 \text{ A}, V_{GE} = 15 \text{ V}$ $I_C = 25 \text{ A}, V_{GE} = 15 \text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | $V_{CE sat}$ | 1,85 2,15 2,25 | 2,25 | V V V | |
| Gate-Schwellenspannung gate threshold voltage | $I_C = 0,85 \text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$ | | 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} | 0,00 | | | 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} | | | 100 | nA |
| Einschaltverzögerungszeit (ind. Last) turn-on delay time (inductive load) | $I_C = 25 \text{ A}, V_{CE} = 600 \text{ V}$ $V_{GE} = \pm 15 \text{ V}$ $R_{Gon} = 37 \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | $t_{d on}$ | 0,05 0,06 0,06 | | | μs μs μs |
| Anstiegszeit (induktive Last) rise time (inductive load) | $I_C = 25 \text{ A}, V_{CE} = 600 \text{ V}$ $V_{GE} = \pm 15 \text{ V}$ $R_{Gon} = 37 \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_r | 0,03 0,04 0,05 | | | μs μs μs |
| Abschaltverzögerungszeit (ind. Last) turn-off delay time (inductive load) | $I_C = 25 \text{ A}, V_{CE} = 600 \text{ V}$ $V_{GE} = \pm 15 \text{ V}$ $R_{Goff} = 37 \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | $t_{d off}$ | 0,34 0,43 0,45 | | | μs μs μs |
| Fallzeit (induktive Last) fall time (inductive load) | $I_C = 25 \text{ A}, V_{CE} = 600 \text{ V}$ $V_{GE} = \pm 15 \text{ V}$ $R_{Goff} = 37 \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | t_f | 0,05 0,07 0,08 | | | μs μs μs |
| Einschaltverlustenergie pro Puls turn-on energy loss per pulse | $I_C = 25 \text{ A}, V_{CE} = 600 \text{ V}$ $V_{GE} = \pm 15 \text{ V}$ $R_{Gon} = 37 \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{on} | 2,00 2,65 2,90 | | | mJ mJ mJ |
| Abschaltverlustenergie pro Puls turn-off energy loss per pulse | $I_C = 25 \text{ A}, V_{CE} = 600 \text{ V}$ $V_{GE} = \pm 15 \text{ V}$ $R_{Goff} = 37 \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{off} | 1,40 2,20 2,40 | | | mJ mJ mJ |
| Kurzschlussverhalten SC data | $V_{GE} \leq 15 \text{ V}, V_{CC} = 900 \text{ V}$ $V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$ $t_p \leq 10 \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$ | | I_{SC} | 90 | | | A |
| Innerer Wärmewiderstand thermal resistance, junction to case | pro IGBT per IGBT | | R_{thJC} | | | 0,95 | K/W |
| Übergangs-Wärmewiderstand thermal resistance, case to heatsink | pro IGBT / per IGBT $\lambda_{Paste} = 1 \text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1 \text{ W}/(\text{m}\cdot\text{K})$ | | R_{thCH} | 0,52 | | | K/W |

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Vorläufige Daten
preliminary data

Diode-Brems-Chopper / Diode-brake-chopper
Höchstzulässige Werte / maximum rated values

| | | | | |
|---|--|-----------|------|----------------------|
| Periodische Spitzenspernspannung repetitive peak reverse voltage | $T_{vj} = 25^{\circ}\text{C}$ | V_{RRM} | 1200 | V |
| Dauergleichstrom DC forward current | | I_F | 15 | A |
| Periodischer Spitzenstrom repetitive peak forw. current | $t_p = 1\text{ ms}$ | I_{FRM} | 30 | A |
| Grenzlastintegral I^2t - value | $V_R = 0\text{ V}, t_p = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$ | I^2t | 48,0 | A^2s |

Charakteristische Werte / characteristic values

| | | | min. | typ. | max. | |
|---|---|---|------------|----------------------|------|---|
| Durchlassspannung forward voltage | $I_F = 15\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 15\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 15\text{ A}, V_{GE} = 0\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | V_F | 1,75 1,75 1,75 | 2,25 | V V V |
| Rückstromspitze peak reverse recovery current | $I_F = 15\text{ A}, -di_F/dt = 1000\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | I_{RM} | 20,0 22,0 23,0 | | A A A |
| Sperrverzögerungsladung recovered charge | $I_F = 15\text{ A}, -di_F/dt = 1000\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | Q_r | 1,50 2,50 2,70 | | μC μC μC |
| Abschaltenergie pro Puls reverse recovery energy | $I_F = 15\text{ A}, -di_F/dt = 1000\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$ | E_{rec} | 0,55 0,90 1,00 | | mJ mJ mJ |
| Innerer Wärmewiderstand thermal resistance, junction to case | pro Diode per diode | | R_{thJC} | | 1,50 | K/W |
| Übergangs-Wärmewiderstand 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} | 0,82 | | K/W |

NTC-Widerstand / NTC-thermistor

Charakteristische Werte / characteristic values

| | | | min. | typ. | max. | |
|--|---|--|--------------|------|------|------------|
| Nennwiderstand rated resistance | $T_C = 25^{\circ}\text{C}$ | | R_{25} | 5,00 | | k Ω |
| Abweichung von R_{100} deviation of R_{100} | $T_C = 100^{\circ}\text{C}, R_{100} = 493\ \Omega$ | | $\Delta R/R$ | -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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Technische Information / technical information

IGBT-Module
IGBT-modules

FP50R12KT4



Vorläufige Daten preliminary data

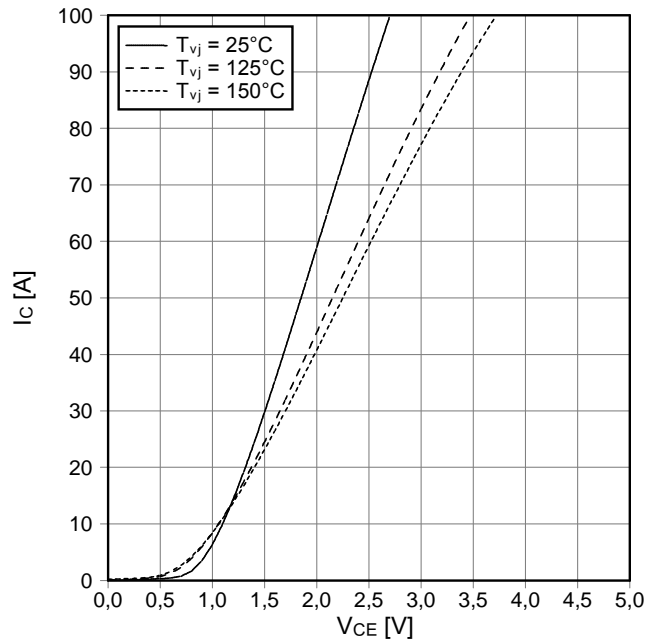
Modul / module

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|--|--|---------------------|--------------------------------|------|------------------|
| Isolations-Prüfspannung insulation test voltage | RMS, f = 50 Hz, t = 1 min. | V _{ISOL} | 2,5 | | kV |
| Material Modulgrundplatte material of module baseplate | | | Cu | | |
| Material für innere Isolation material for internal insulation | | | Al ₂ O ₃ | | |
| Kriechstrecke creepage distance | Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal | | 10,0 | | mm |
| Luftstrecke clearance distance | Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal | | 7,5 | | mm |
| Vergleichszahl der Kriechwegbildung comparative tracking index | | CTI | > 200 | | |
| | | | min. | typ. | max. |
| Übergangs-Wärmewiderstand thermal resistance, case to heatsink | pro Modul / per module $\lambda_{\text{Paste}} = 1 \text{ W}/(\text{m}\cdot\text{K}) / \lambda_{\text{grease}} = 1 \text{ W}/(\text{m}\cdot\text{K})$ | R _{thCH} | | 0,02 | K/W |
| Modulinduktivität stray inductance module | | L _{sCE} | | 35 | nH |
| Höchstzulässige Sperrschichttemperatur maximum junction temperature | Wechselrichter, Brems-Chopper / Inverter, Brake-Chopper Gleichrichter / rectifier | T _{vj max} | | | 175 °C 150 °C |
| Temperatur im Schaltbetrieb temperature under switching conditions | Wechselrichter, Brems-Chopper / Inverter, Brake-Chopper Gleichrichter / rectifier | T _{vj op} | -40 -40 | | 150 °C 150 °C |
| Lagertemperatur storage temperature | | T _{stg} | -40 | | 125 °C |
| Anzugsdrehmoment f. mech. Befestigung mounting torque | Schraube M5 - Montage gem. gültiger Applikation Note screw M5 - mounting according to valid application note | M | 3,00 | - | 6,00 Nm |
| Gewicht weight | | G | | 180 | g |

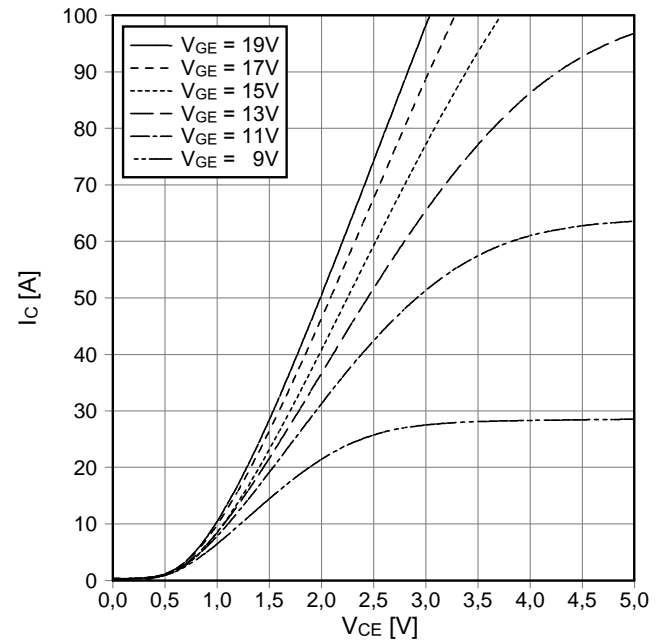
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| approved by: Robert Severin | revision: 2.0 |

Vorläufige Daten
preliminary data

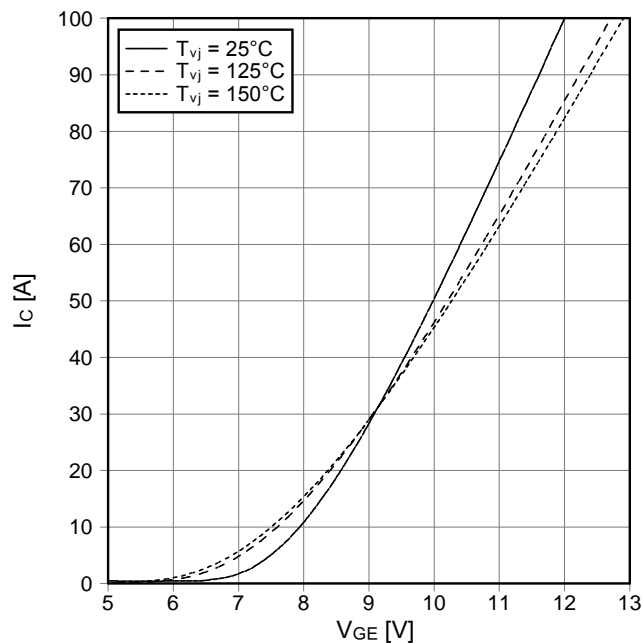
Ausgangskennlinie IGBT-Wechselr. (typisch)
output characteristic IGBT-inverter (typical)
 $I_C = f(V_{CE})$
 $V_{GE} = 15\text{ V}$



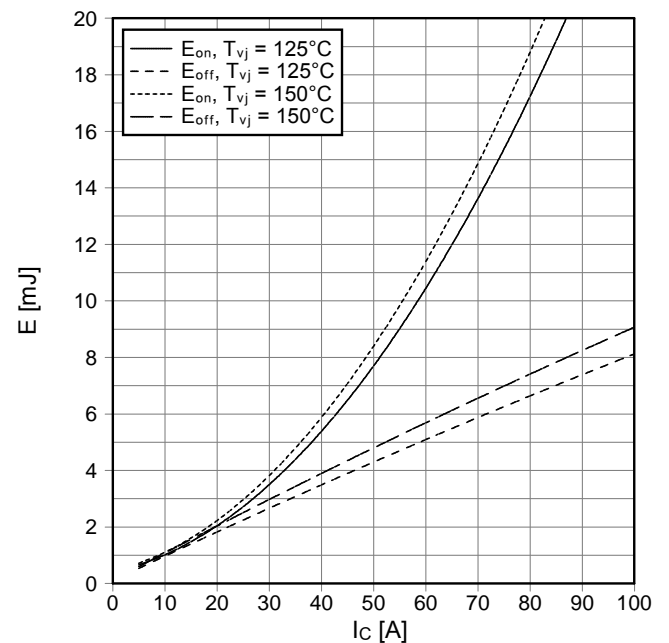
Ausgangskennlinienfeld IGBT-Wechselr. (typisch)
output characteristic IGBT-inverter (typical)
 $I_C = f(V_{CE})$
 $T_{vj} = 150^\circ\text{C}$



Übertragungscharakteristik IGBT-Wechselr. (typisch)
transfer characteristic IGBT-inverter (typical)
 $I_C = f(V_{GE})$
 $V_{CE} = 20\text{ V}$



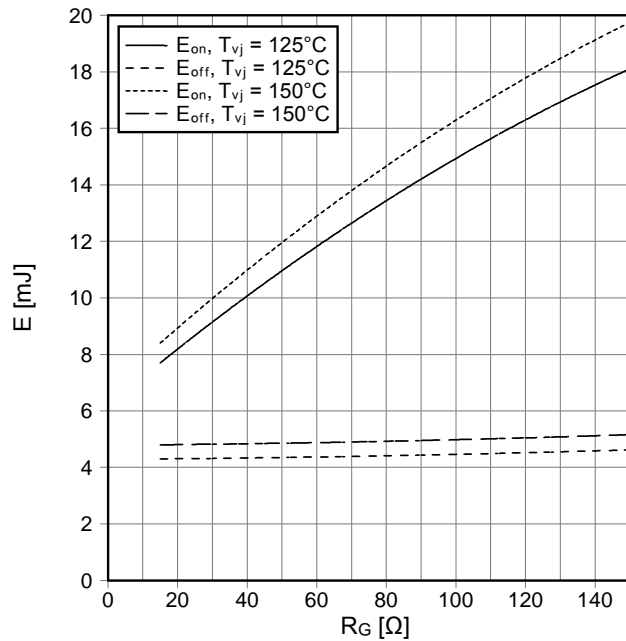
Schaltverluste IGBT-Wechselr. (typisch)
switching losses IGBT-inverter (typical)
 $E_{on} = f(I_C)$, $E_{off} = f(I_C)$
 $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 15\ \Omega$, $R_{Goff} = 15\ \Omega$, $V_{CE} = 600\text{ V}$



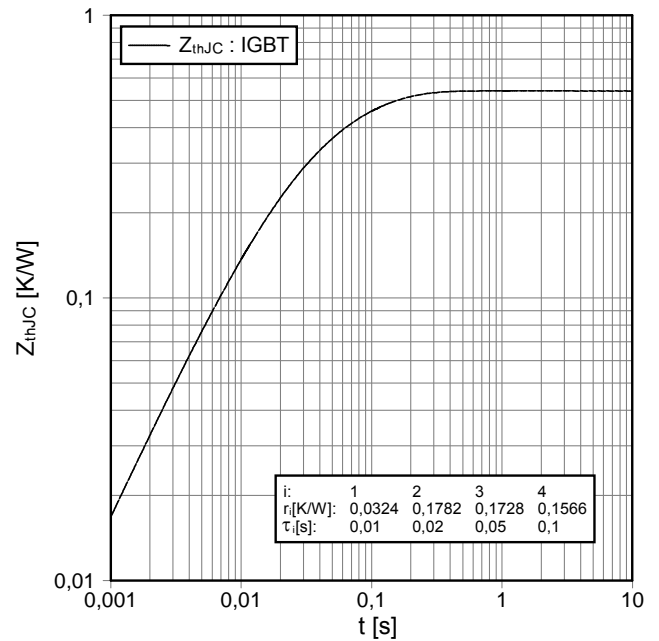
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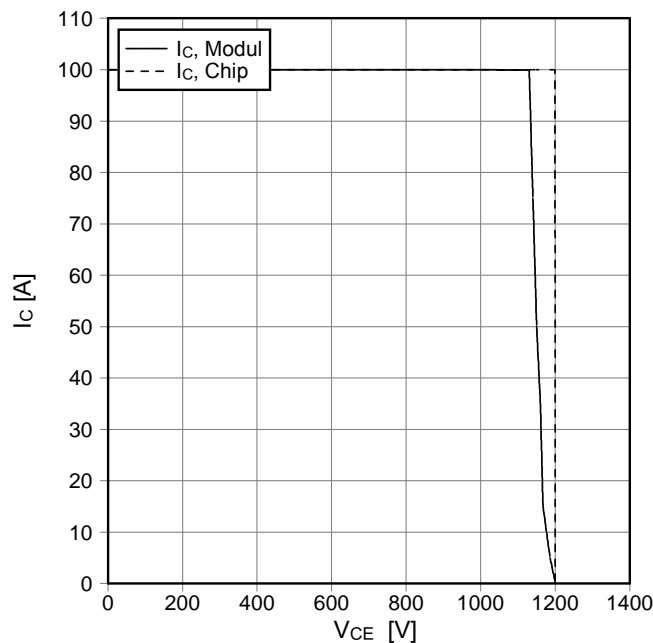
Schaltverluste IGBT-Wechselr. (typisch)
switching losses IGBT-inverter (typical)
 $E_{on} = f(R_G)$, $E_{off} = f(R_G)$
 $V_{GE} = \pm 15\text{ V}$, $I_C = 50\text{ A}$, $V_{CE} = 600\text{ V}$



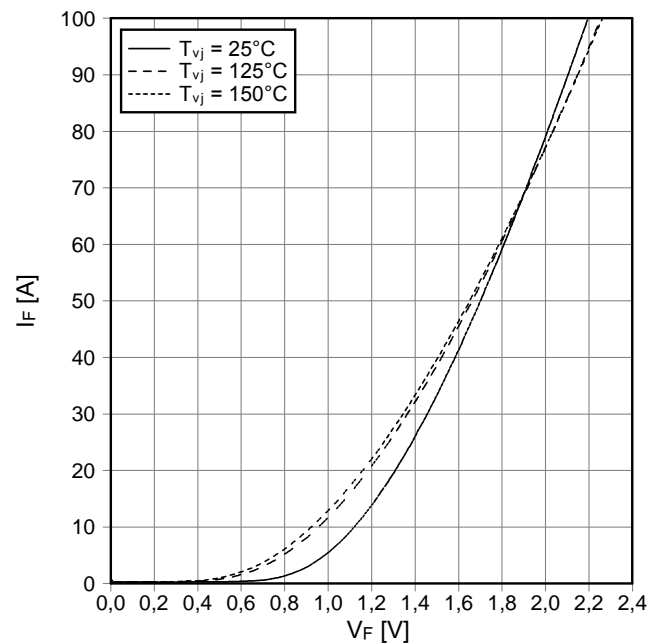
Transienter Wärmewiderstand IGBT-Wechselr.
transient thermal impedance IGBT-inverter
 $Z_{thJC} = f(t)$



Sicherer Rückwärts-Arbeitsbereich IGBT-Wr. (RBSOA)
reverse bias safe operating area IGBT-inv. (RBSOA)
 $I_C = f(V_{CE})$
 $V_{GE} = \pm 15\text{ V}$, $R_{Goff} = 15\ \Omega$, $T_{vj} = 150^\circ\text{C}$



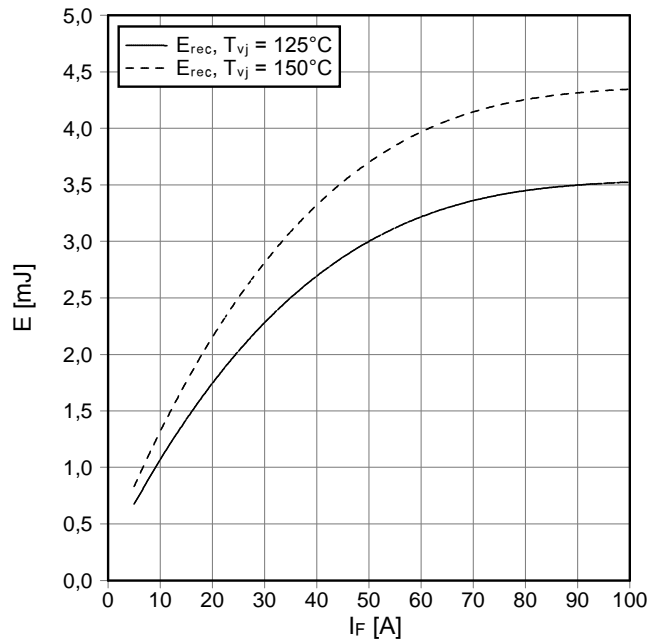
Durchlasskennlinie der Diode-Wechselr. (typisch)
forward characteristic of diode-inverter (typical)
 $I_F = f(V_F)$



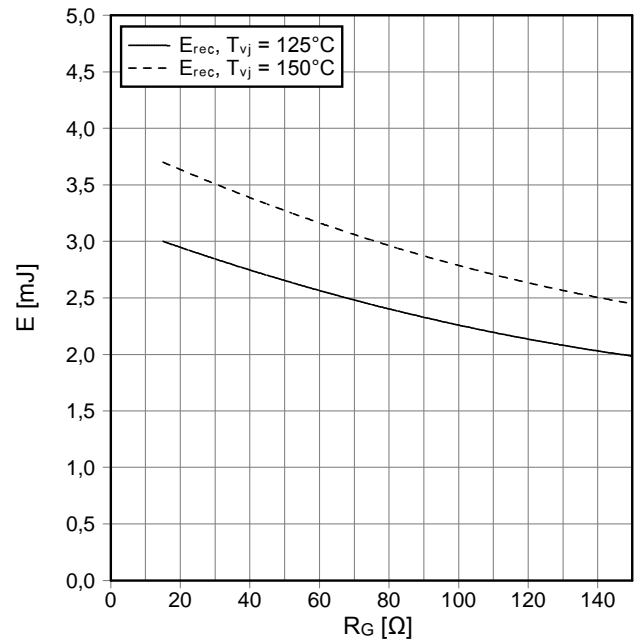
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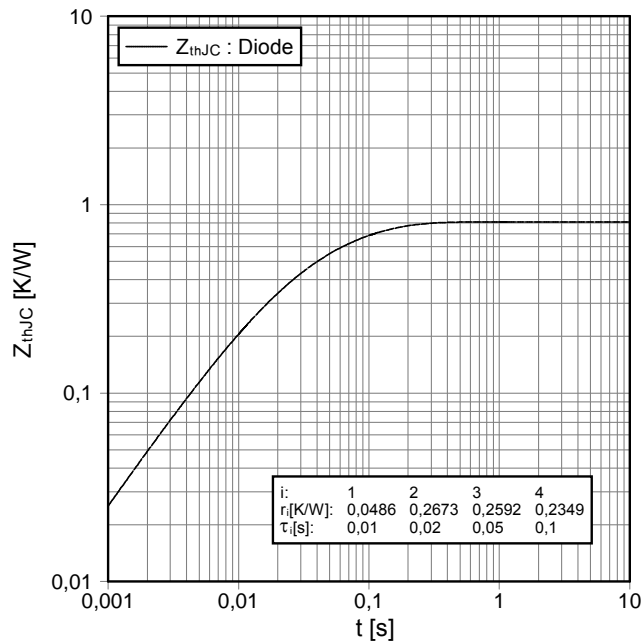
Schaltverluste Diode-Wechselr. (typisch)
switching losses diode-inverter (typical)
 $E_{rec} = f(I_F)$
 $R_{Gon} = 15 \Omega$, $V_{CE} = 600 V$



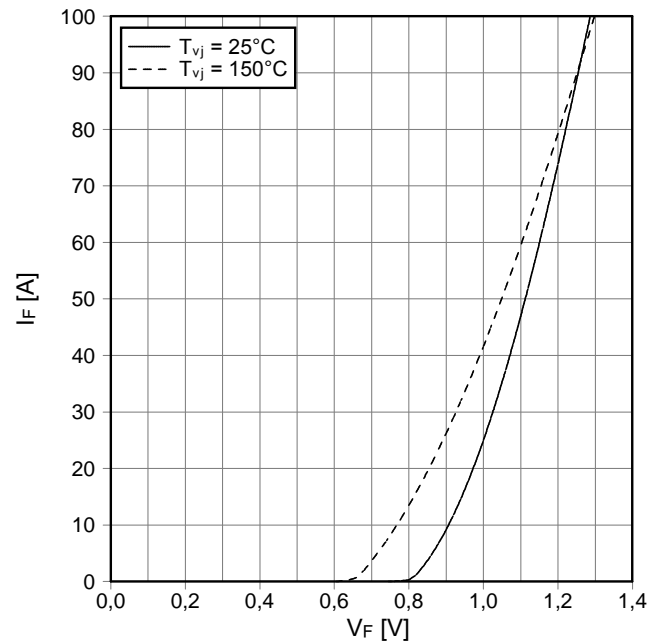
Schaltverluste Diode-Wechselr. (typisch)
switching losses diode-inverter (typical)
 $E_{rec} = f(R_G)$
 $I_F = 50 A$, $V_{CE} = 600 V$



Transienter Wärmewiderstand Diode-Wechselr.
transient thermal impedance diode-inverter
 $Z_{thJC} = f(t)$



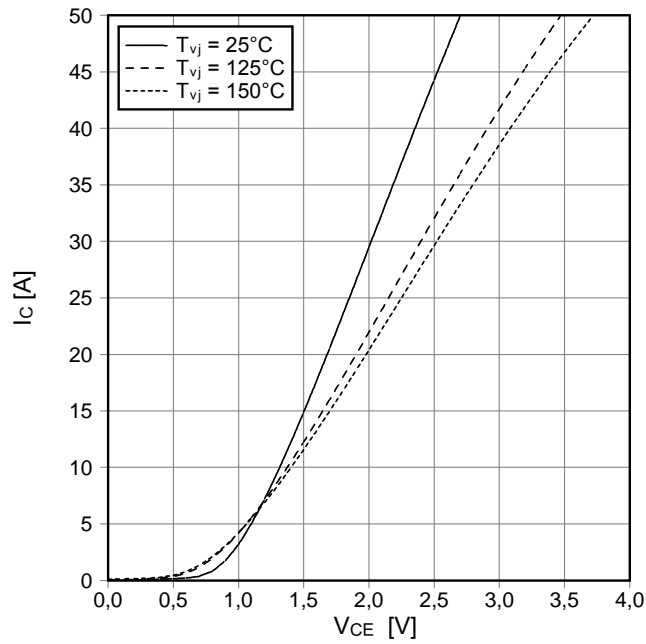
Durchlasskennlinie der Diode-Gleichrichter (typisch)
forward characteristic of diode-rectifier (typical)
 $I_F = f(V_F)$



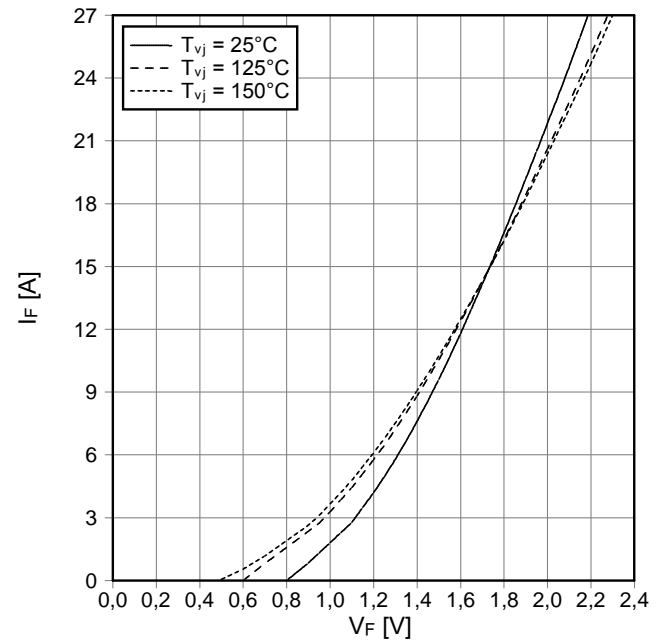
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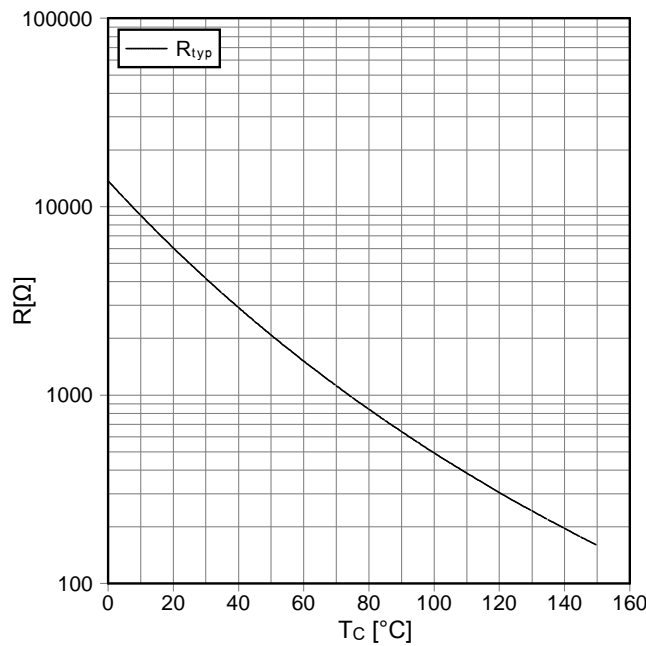
Ausgangskennlinie IGBT-Brems-Chopper (typisch)
output characteristic IGBT-brake-chopper (typical)
 $I_C = f(V_{CE})$
 $V_{GE} = 15\text{ V}$



Durchlasskennlinie der Diode-Brems-Chopper (typisch)
forward characteristic of Diode-brake-chopper (typical)
 $I_F = f(V_F)$

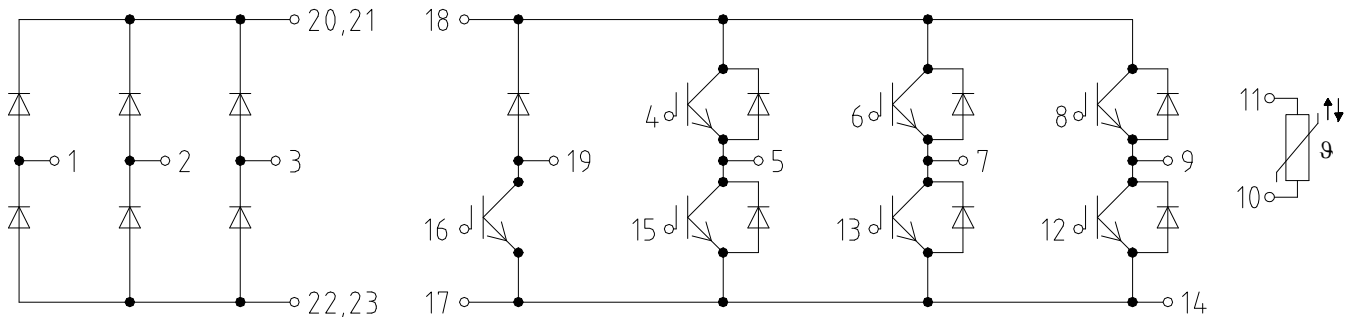


NTC-Temperaturkennlinie (typisch)
NTC-temperature characteristic (typical)
 $R = f(T)$

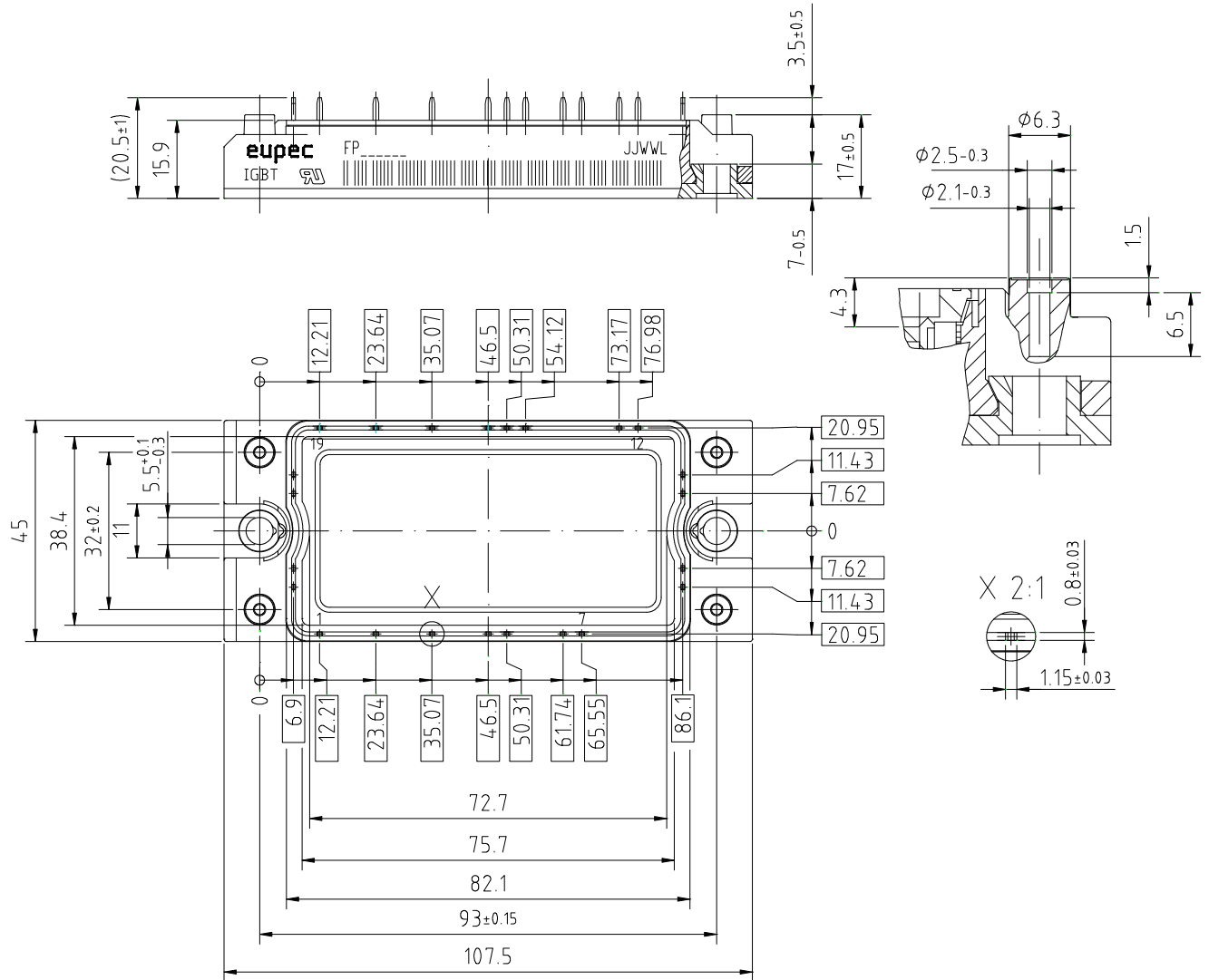


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Schaltplan / circuit diagram



Gehäuseabmessungen / package outlines



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Vorläufige Daten
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