

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 DC-collector current | $T_C = 80^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}$ | $I_{C\ nom}$ I_C | 25 40 | A A |
| Periodischer Kollektor Spitzenstrom repetitive peak collector current | $t_P = 1\ \text{ms}, T_C = 80^{\circ}\text{C}$ | I_{CRM} | 50 | A |
| Gesamt-Verlustleistung total power dissipation | $T_C = 25^{\circ}\text{C}$ | P_{tot} | 155 | 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 | $I_C = 25\ \text{A}, V_{GE} = 15\ \text{V}, T_{vj} = 25^{\circ}\text{C}$ $I_C = 25\ \text{A}, V_{GE} = 15\ \text{V}, T_{vj} = 125^{\circ}\text{C}$ | $V_{CE\ sat}$ | | 1,70 1,90 | 2,15 | V V |
| Gate-Schwellenspannung gate threshold voltage | $I_C = 1,00\ \text{mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$ | V_{GEth} | 5,0 | 5,8 | 6,5 | V |
| Gateladung gate charge | $V_{GE} = -15\ \text{V} \dots +15\ \text{V}$ | Q_G | | 0,24 | | μC |
| Interner Gatewiderstand internal gate resistor | $T_{vj} = 25^{\circ}\text{C}$ | R_{Gint} | | 8,0 | | 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} | | 1,80 | | 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} | | 0,064 | | 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} | | | 5,0 | 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 (ind. Last) turn-on delay time (inductive load) | $I_C = 25\ \text{A}, V_{CE} = 600\ \text{V}$ $V_{GE} = \pm 15\ \text{V}, R_{Gon} = 36\ \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15\ \text{V}, R_{Gon} = 36\ \Omega, T_{vj} = 125^{\circ}\text{C}$ | $t_{d\ on}$ | | 0,09 0,09 | | μs μs |
| Anstiegszeit (induktive Last) rise time (inductive load) | $I_C = 25\ \text{A}, V_{CE} = 600\ \text{V}$ $V_{GE} = \pm 15\ \text{V}, R_{Gon} = 36\ \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15\ \text{V}, R_{Gon} = 36\ \Omega, T_{vj} = 125^{\circ}\text{C}$ | t_r | | 0,03 0,05 | | μs μs |
| Abschaltverzögerungszeit (ind. Last) turn-off delay time (inductive load) | $I_C = 25\ \text{A}, V_{CE} = 600\ \text{V}$ $V_{GE} = \pm 15\ \text{V}, R_{Goff} = 36\ \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15\ \text{V}, R_{Goff} = 36\ \Omega, T_{vj} = 125^{\circ}\text{C}$ | $t_{d\ off}$ | | 0,42 0,52 | | μs μs |
| Fallzeit (induktive Last) fall time (inductive load) | $I_C = 25\ \text{A}, V_{CE} = 600\ \text{V}$ $V_{GE} = \pm 15\ \text{V}, R_{Goff} = 36\ \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15\ \text{V}, R_{Goff} = 36\ \Omega, T_{vj} = 125^{\circ}\text{C}$ | t_f | | 0,07 0,09 | | μs μs |
| Einschaltverlustenergie pro Puls turn-on energy loss per pulse | $I_C = 25\ \text{A}, V_{CE} = 600\ \text{V}, L_S = 45\ \text{nH}$ $V_{GE} = \pm 15\ \text{V}, R_{Gon} = 36\ \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15\ \text{V}, R_{Gon} = 36\ \Omega, T_{vj} = 125^{\circ}\text{C}$ | E_{on} | | 2,40 3,50 | | mJ mJ |
| Abschaltverlustenergie pro Puls turn-off energy loss per pulse | $I_C = 25\ \text{A}, V_{CE} = 600\ \text{V}, L_S = 45\ \text{nH}$ $V_{GE} = \pm 15\ \text{V}, R_{Goff} = 36\ \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15\ \text{V}, R_{Goff} = 36\ \Omega, T_{vj} = 125^{\circ}\text{C}$ | E_{off} | | 1,80 2,10 | | mJ mJ |
| Kurzschlußverhalten SC data | $t_P \leq 10\ \mu\text{s}, V_{GE} \leq 15\ \text{V}$ $T_{vj} \leq 125^{\circ}\text{C}, V_{CC} = 900\ \text{V}, V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$ | I_{SC} | | 100 | | A |
| Innerer Wärmewiderstand thermal resistance, junction to case | pro IGBT per IGBT | R_{thJC} | | | 0,80 | K/W |

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Vorläufige Daten
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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 | 25 | A |
| Periodischer Spitzenstrom repetitive peak forward current | $t_p = 1 \text{ ms}$ | I_{FRM} | 50 | A |
| Grenzlastintegral I^2t - value | $V_R = 0 \text{ V}, t_p = 10 \text{ ms}, T_{vj} = 125^{\circ}\text{C}$ | I^2t | 170 | A^2s |

Charakteristische Werte/characteristic values

| | | | min. | typ. | max. | |
|---|---|------------|------|--------------|------|--------------------------------|
| Durchlassspannung forward voltage | $I_F = 25 \text{ A}, V_{GE} = 0 \text{ V}, T_{vj} = 25^{\circ}\text{C}$ $I_F = 25 \text{ A}, V_{GE} = 0 \text{ V}, T_{vj} = 125^{\circ}\text{C}$ | V_F | | 1,65 1,65 | 2,15 | V V |
| Rückstromspitze peak reverse recovery current | $I_F = 25 \text{ A}, -di_F/dt = 700 \text{ A}/\mu\text{s}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 25^{\circ}\text{C}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 125^{\circ}\text{C}$ | I_{RM} | | 26,0 24,0 | | A A |
| Sperrverzögerungsladung recovered charge | $I_F = 25 \text{ A}, -di_F/dt = 700 \text{ A}/\mu\text{s}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 25^{\circ}\text{C}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 125^{\circ}\text{C}$ | Q_r | | 2,80 5,00 | | μC μC |
| Abschaltenergie pro Puls reverse recovery energy | $I_F = 25 \text{ A}, -di_F/dt = 700 \text{ A}/\mu\text{s}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 25^{\circ}\text{C}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 125^{\circ}\text{C}$ | E_{rec} | | 0,90 1,80 | | mJ mJ |
| Innerer Wärmewiderstand thermal resistance, junction to case | pro Diode per diode | R_{thJC} | | | 1,35 | 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} | 50 | A |
| Gleichrichter Ausgang Grenzeffektivstrom maximum RMS current at Rectifier output | $T_C = 80^{\circ}\text{C}$ | I_{RMSM} | 60 | 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} | 315 260 | 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 | 495 340 | 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 | | 1,05 | | V |
| Sperrstrom reverse current | $T_{vj} = 150^{\circ}\text{C}, V_R = 1600 \text{ V}$ | I_R | | 2,00 | | mA |
| Innerer Wärmewiderstand thermal resistance, junction to case | pro Diode per diode | R_{thJC} | | | 1,00 | 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 | $T_c = 80^{\circ}\text{C}$ $T_c = 25^{\circ}\text{C}$ | I_{Cnom} I_C | 15 25 | A A |
| Periodischer Kollektor Spitzenstrom repetitive peak collector current | $t_P = 1 \text{ ms}, T_c = 80^{\circ}\text{C}$ | I_{CRM} | 30 | A |
| Gesamt-Verlustleistung total power dissipation | $T_c = 25^{\circ}\text{C}$ | P_{tot} | 105 | 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 | $I_C = 15 \text{ A}, V_{GE} = 15 \text{ V}, T_{vj} = 25^{\circ}\text{C}$ $I_C = 15 \text{ A}, V_{GE} = 15 \text{ V}, T_{vj} = 125^{\circ}\text{C}$ | $V_{CE sat}$ | | 1,70 1,90 | 2,15 | V V |
| Gate-Schwellenspannung gate threshold voltage | $I_C = 0,50 \text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$ | V_{GEth} | 5,0 | 5,8 | 6,5 | V |
| Gateladung gate charge | $V_{GE} = -15 \text{ V} \dots +15 \text{ V}$ | Q_G | | 0,15 | | μC |
| Interner Gatewiderstand internal gate resistor | | 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} | | 1,10 | | 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} | | 0,04 | | 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} | | | 5,0 | 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 (ind. Last) turn-on delay time (inductive load) | $I_C = 15 \text{ A}, V_{CE} = 600 \text{ V}$ $V_{GE} = \pm 15 \text{ V}, R_{Gon} = 75 \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15 \text{ V}, R_{Gon} = 75 \Omega, T_{vj} = 125^{\circ}\text{C}$ | $t_{d on}$ | | 0,09 0,09 | | μs μs |
| Anstiegszeit (induktive Last) rise time (inductive load) | $I_C = 15 \text{ A}, V_{CE} = 600 \text{ V}$ $V_{GE} = \pm 15 \text{ V}, R_{Gon} = 75 \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15 \text{ V}, R_{Gon} = 75 \Omega, T_{vj} = 125^{\circ}\text{C}$ | t_r | | 0,03 0,05 | | μs μs |
| Abschaltverzögerungszeit (ind. Last) turn-off delay time (inductive load) | $I_C = 15 \text{ A}, V_{CE} = 600 \text{ V}$ $V_{GE} = \pm 15 \text{ V}, R_{Goff} = 75 \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15 \text{ V}, R_{Goff} = 75 \Omega, T_{vj} = 125^{\circ}\text{C}$ | $t_{d off}$ | | 0,42 0,52 | | μs μs |
| Fallzeit (induktive Last) fall time (inductive load) | $I_C = 15 \text{ A}, V_{CE} = 600 \text{ V}$ $V_{GE} = \pm 15 \text{ V}, R_{Goff} = 75 \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15 \text{ V}, R_{Goff} = 75 \Omega, T_{vj} = 125^{\circ}\text{C}$ | t_f | | 0,07 0,09 | | μs μs |
| Einschaltverlustenergie pro Puls turn-on energy loss per pulse | $I_C = 15 \text{ A}, V_{CE} = 600 \text{ V}$ $V_{GE} = \pm 15 \text{ V}, R_{Gon} = 75 \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15 \text{ V}, R_{Gon} = 75 \Omega, T_{vj} = 125^{\circ}\text{C}$ | E_{on} | | 1,50 2,10 | | mJ mJ |
| Abschaltverlustenergie pro Puls turn-off energy loss per pulse | $I_C = 15 \text{ A}, V_{CE} = 600 \text{ V}$ $V_{GE} = \pm 15 \text{ V}, R_{Goff} = 75 \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15 \text{ V}, R_{Goff} = 75 \Omega, T_{vj} = 125^{\circ}\text{C}$ | E_{off} | | 1,10 1,30 | | mJ mJ |
| Kurzschlußverhalten SC data | $t_P \leq 10 \mu\text{sec}, V_{GE} \leq 15 \text{ V}$ $T_{vj} \leq 125^{\circ}\text{C}, V_{CC} = 900 \text{ V}, V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$ | I_{SC} | | 60 | | A |
| Innerer Wärmewiderstand thermal resistance, junction to case | pro IGBT per IGBT | R_{thJC} | | | 1,20 | K/W |

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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 DC forward current | | I_F | 10 | A |
| Periodischer Spitzenstrom repetitive peak forw. current | $t_p = 1 \text{ ms}$ | I_{FRM} | 20 | A |
| Grenzlastintegral I^2t - value | $V_R = 0 \text{ V}, t_p = 10 \text{ ms}, T_{vj} = 125^{\circ}\text{C}$ | I^2t | 20,0 | A ² s |

Charakteristische Werte/characteristic values

| | | | min. | typ. | max. | |
|---|---|------------|------|--------------|------|--------------------------------|
| Durchlaßspannung forward voltage | $I_F = 10 \text{ A}, V_{GE} = 0 \text{ V}, T_{vj} = 25^{\circ}\text{C}$ $I_F = 10 \text{ A}, V_{GE} = 0 \text{ V}, T_{vj} = 125^{\circ}\text{C}$ | V_F | | 1,80 1,85 | 2,25 | V V |
| Rückstromspitze peak reverse recovery current | $I_F = 10 \text{ A}, -di_F/dt = 400 \text{ A}/\mu\text{s}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 25^{\circ}\text{C}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 125^{\circ}\text{C}$ | I_{RM} | | 14,0 15,0 | | A A |
| Sperrverzögerungsladung recovered charge | $I_F = 10 \text{ A}, -di_F/dt = 400 \text{ A}/\mu\text{s}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 25^{\circ}\text{C}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 125^{\circ}\text{C}$ | Q_r | | 1,00 1,80 | | μC μC |
| Abschaltenergie pro Puls reverse recovery energy | $I_F = 10 \text{ A}, -di_F/dt = 400 \text{ A}/\mu\text{s}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 25^{\circ}\text{C}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 125^{\circ}\text{C}$ | E_{rec} | | 0,26 0,56 | | mJ mJ |
| Innerer Wärmewiderstand thermal resistance, junction to case | pro Diode per diode | R_{thJC} | | | 2,30 | 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 | $R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298, 15K))]$ | $B_{25/50}$ | | 3375 | | K |

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Technische Information/technical information

IGBT-Module
IGBT-modules

FP25R12KT3



Vorläufige Daten preliminary data

Modul/module

| | | | | | |
|--|--|--|--------------------------------|------|---------|
| Isolations-Prüfspannung insulation test voltage | RMS, f = 50 Hz, t = 1 min. | V _{ISO} | 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 | | 7,50 | | mm |
| Vergleichszahl der Kriechwegbildung comparative tracking index | | CTI | > 225 | | |
| | | | 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} | 60 | | 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 3,00 | | mΩ |
| Höchstzulässige Sperrschichttemperatur maximum junction temperature | | T _{vj max} | | 150 | °C |
| Temperatur im Schaltbetrieb temperature under switching conditions | | T _{vj op} | -40 | 125 | °C |
| Lagertemperatur storage temperature | | T _{stg} | -40 | 125 | °C |
| Anzugsdrehmoment f. mech. Befestigung mounting torque | Schraube / screw M5 | M | 3,00 | - | 6,00 Nm |
| Gewicht weight | | G | 180 | | g |

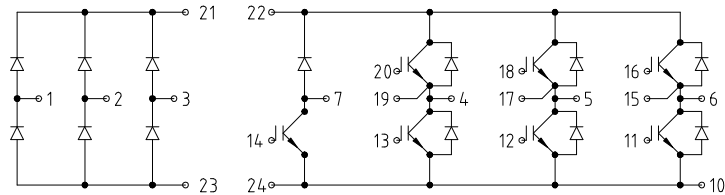
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This technical information specifies semiconductor devices but guarantees no characteristics. It is valid with the appropriate technical explanations.

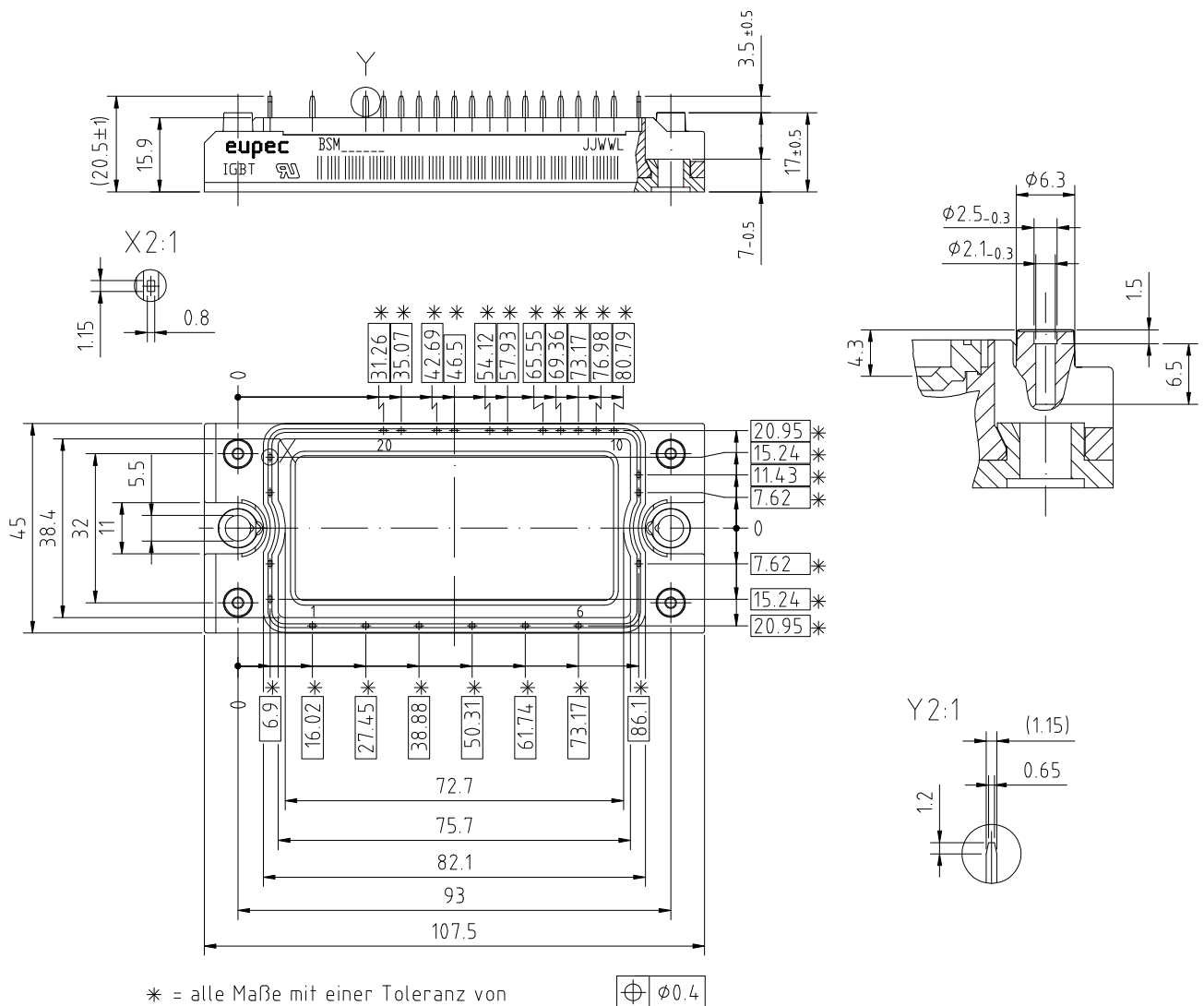
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Schaltplan/circuit diagram



Gehäuseabmessungen/package outlines



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