

Technische Information / technical information

IGBT-Module
IGBT-modules

FF300R12KT3



62mm C-Serien Modul mit schnellem Trench/Feldstop IGBT3 und EmCon High Efficiency Diode
62mm C-series module with fast trench/fieldstop IGBT3 and EmCon High Efficiency diode

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 | $T_C = 80^{\circ}\text{C}, T_{vj} = 150^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}, T_{vj} = 150^{\circ}\text{C}$ | $I_{C\text{ nom}}$ I_C | 300 480 | A A |
| Periodischer Kollektor Spitzenstrom repetitive peak collector current | $t_p = 1\text{ ms}$ | I_{CRM} | 600 | A |
| Gesamt-Verlustleistung total power dissipation | $T_C = 25^{\circ}\text{C}, T_{vj} = 150^{\circ}\text{C}$ | P_{tot} | 1450 | 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 | $I_C = 300\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 300\text{ A}, V_{GE} = 15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | $V_{CE\text{ sat}}$ | 1,70 1,90 | 2,15 | V V | |
| Gate-Schwellenspannung gate threshold voltage | $I_C = 12,0\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$ | | V_{GEth} | 5,0 | 5,8 | 6,5 | V |
| Gateladung gate charge | $V_{GE} = -15\text{ V} \dots +15\text{ V}$ | | Q_G | 2,80 | | | μC |
| Interner Gatewiderstand internal gate resistor | $T_{vj} = 25^{\circ}\text{C}$ | | R_{Gint} | 2,5 | | | 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} | 21,0 | | | 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} | 0,85 | | | 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) | $I_C = 300\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 2,4\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | $t_{d\text{ on}}$ | 0,16 0,17 | | | μs μs |
| Anstiegszeit (induktive Last) rise time (inductive load) | $I_C = 300\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 2,4\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | t_r | 0,04 0,045 | | | μs μs |
| Abschaltverzögerungszeit (ind. Last) turn-off delay time (inductive load) | $I_C = 300\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 2,4\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | $t_{d\text{ off}}$ | 0,45 0,52 | | | μs μs |
| Fallzeit (induktive Last) fall time (inductive load) | $I_C = 300\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 2,4\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | t_f | 0,10 0,16 | | | μs μs |
| Einschaltverlustenergie pro Puls turn-on energy loss per pulse | $I_C = 300\text{ A}, V_{CE} = 600\text{ V}, L_S = 30\text{ nH}$ $V_{GE} = \pm 15\text{ V}, di/dt = 6000\text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $R_{Gon} = 2,4\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | E_{on} | 16,5 25,0 | | | mJ mJ |
| Abschaltverlustenergie pro Puls turn-off energy loss per pulse | $I_C = 300\text{ A}, V_{CE} = 600\text{ V}, L_S = 30\text{ nH}$ $V_{GE} = \pm 15\text{ V}, du/dt = 4500\text{ V}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $R_{Goff} = 2,4\ \Omega$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | E_{off} | 24,5 37,0 | | | 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} | 1200 | | | A |
| Innerer Wärmewiderstand thermal resistance, junction to case | pro IGBT per IGBT | | R_{thJC} | | 0,085 | | 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} | 0,03 | | | K/W |

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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 | 300 | A |
| Periodischer Spitzenstrom repetitive peak forward current | $t_p = 1\text{ ms}$ | I_{FRM} | 600 | A |
| Grenzlastintegral I^2t - value | $V_R = 0\text{ V}, t_p = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$ | I^2t | 19000 | A^2s |

Charakteristische Werte / characteristic values

| | | | min. | typ. | max. | |
|---|---|---|------------|--------------|------|--------------------------------|
| Durchlassspannung forward voltage | $I_F = 300\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 300\text{ A}, V_{GE} = 0\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | V_F | 1,65 1,65 | 2,15 | V V |
| Rückstromspitze peak reverse recovery current | $I_F = 300\text{ A}, -di_F/dt = 6000\text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | I_{RM} | 210 270 | | A A |
| Sperrverzögerungsladung recovered charge | $I_F = 300\text{ A}, -di_F/dt = 6000\text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | Q_r | 30,0 56,0 | | μC μC |
| Abschaltenergie pro Puls reverse recovery energy | $I_F = 300\text{ A}, -di_F/dt = 6000\text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$ | $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ | E_{rec} | 14,0 26,0 | | mJ mJ |
| Innerer Wärmewiderstand thermal resistance, junction to case | pro Diode per diode | | R_{thJC} | | 0,15 | K/W |
| Übergangs-Wärmewiderstand thermal resistance, case to heatsink | pro Diode / per diode $\lambda_{\text{Paste}} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{\text{grease}} = 1\text{ W}/(\text{m}\cdot\text{K})$ | | R_{thCH} | 0,06 | | K/W |

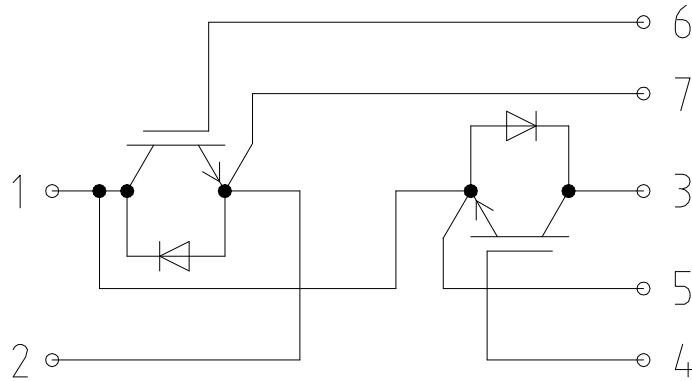
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Modul / module

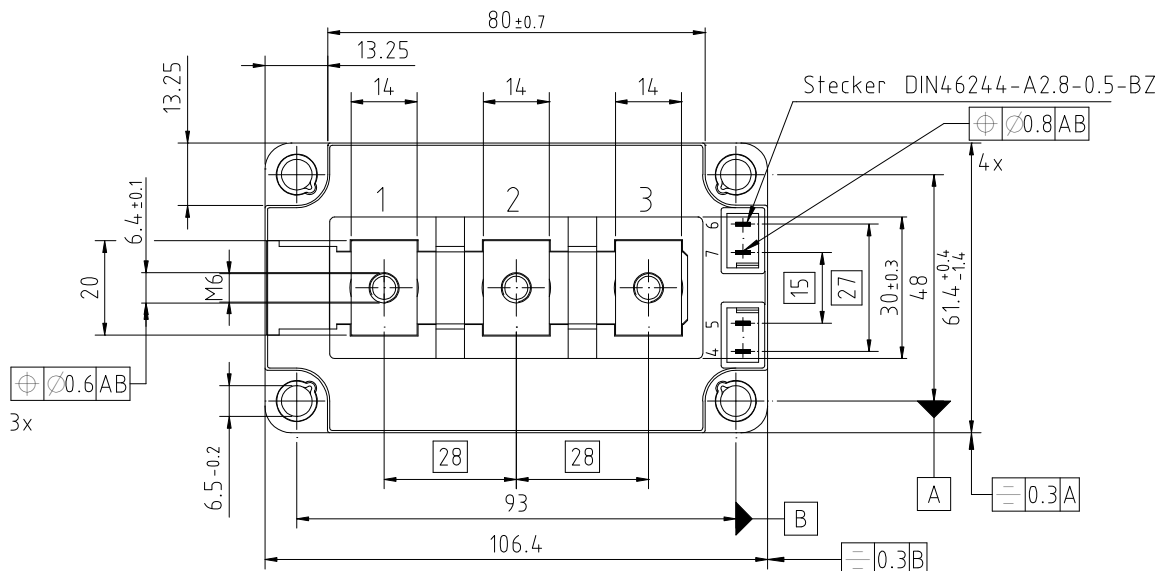
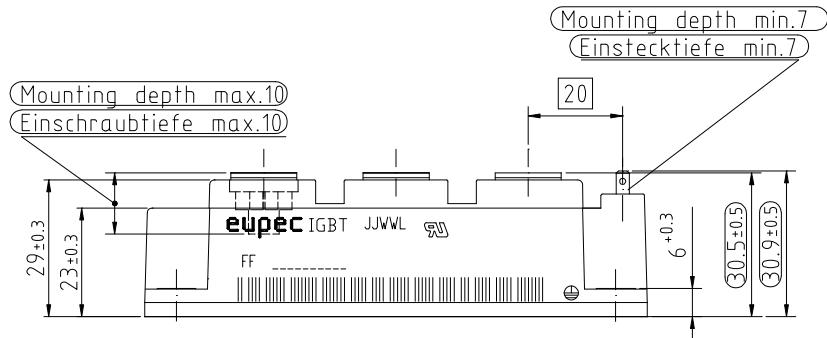
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|--|--|----------------------|--------------------------------|------|---------|
| Isolations-Prüfspannung insulation test voltage | RMS, f = 50 Hz, t = 1 min. | V _{ISOL} | 2,5 | | kV |
| Material Modulgrundplatte material of module baseplate | | | 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 | | 29,0 23,0 | | mm |
| Luftstrecke clearance distance | Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal | | 23,0 11,0 | | mm |
| Vergleichszahl der Kriechwegbildung comparative tracking index | | CTI | > 400 | | |
| | | | 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} | | 0,01 | K/W |
| Modulinduktivität stray inductance module | | L _{sCE} | | 20 | nH |
| Modulleitungswiderstand, Anschlüsse - Chip module lead resistance, terminals - chip | T _C = 25°C, pro Schalter / per switch | R _{CC'+EE'} | | 0,70 | mΩ |
| Höchstzulässige Sperrschichttemperatur maximum junction temperature | Wechselrichter, Brems-Chopper / Inverter, Brake-Chopper | T _{vj max} | | | 150 °C |
| Temperatur im Schaltbetrieb temperature under switching conditions | Wechselrichter, Brems-Chopper / Inverter, Brake-Chopper | T _{vj op} | -40 | | 125 °C |
| Lagertemperatur storage temperature | | T _{stg} | -40 | | 125 °C |
| Anzugsdrehmoment f. mech. Befestigung mounting torque | Schraube M6 - Montage gem. gültiger Applikation Note screw M6 - mounting according to valid application note | M | 3,00 | - | 6,00 Nm |
| Anzugsdrehmoment f. elektr. Anschlüsse terminal connection torque | Schraube M6 - Montage gem. gültiger Applikation Note screw M6 - mounting according to valid application note | M | 2,5 | - | 5,0 Nm |
| Gewicht weight | | G | | 340 | g |

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Schaltplan / circuit diagram



Gehäuseabmessungen / package outlines



Freimaßtoleranzen
nach ISO2768 mH

General tolerance
ISO2768 mH

Az24

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