

Technische Information / technical information

IGBT-Module
IGBT-modules

FF300R12ME3



EconoDUAL™ Modul mit Trench/Feldstop IGBT3 und High Efficiency Diode
EconoDUAL™ module with trench/fieldstop IGBT3 and EmCon High Efficiency 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	$T_C = 80^{\circ}\text{C}, T_{vj} = 150^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}, T_{vj} = 150^{\circ}\text{C}$	$I_{C\text{ nom}}$ I_C	300 500	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 2,00	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	2,70		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}	1,00		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)	$I_C = 300\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 2,4\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$t_{d\text{ on}}$	0,25 0,30		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	0,09 0,10		μs μs
Abschaltverzögerungszeit (ind. Last) turn-off delay time (inductive load)	$I_C = 300\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 2,4\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$t_{d\text{ off}}$	0,55 0,65		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	0,13 0,16		μs μs
Einschaltverlustenergie pro Puls turn-on energy loss per pulse	$I_C = 300\text{ A}, V_{CE} = 600\text{ V}, L_S = 80\text{ nH}$ $V_{GE} = \pm 15\text{ V}, di/dt = 5200\text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $R_{Gon} = 2,4\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	E_{on}	15,0 22,0		mJ mJ
Abschaltverlustenergie pro Puls turn-off energy loss per pulse	$I_C = 300\text{ A}, V_{CE} = 600\text{ V}, L_S = 80\text{ nH}$ $V_{GE} = \pm 15\text{ V}, du/dt = 3600\text{ V}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $R_{Goff} = 2,4\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	E_{off}	29,0 43,0		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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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	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	$I_F = 300 \text{ A}, -di_F/dt = 5200 \text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 600 \text{ V}$ $V_{GE} = -15 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	I_{RM}	210 270		A A
Sperrverzögerungsladung recovered charge	$I_F = 300 \text{ A}, -di_F/dt = 5200 \text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 600 \text{ V}$ $V_{GE} = -15 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	Q_r	30,0 57,0		μC μC
Abschaltenergie pro Puls reverse recovery energy	$I_F = 300 \text{ A}, -di_F/dt = 5200 \text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 600 \text{ V}$ $V_{GE} = -15 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	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 $\lambda_{Paste} = 1 \text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1 \text{ W}/(\text{m}\cdot\text{K})$		R_{thCH}	0,05		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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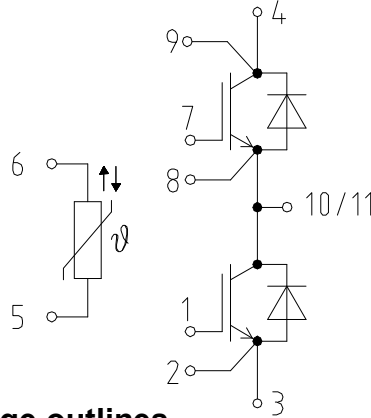
Vorläufige Daten preliminary data

Modul / module

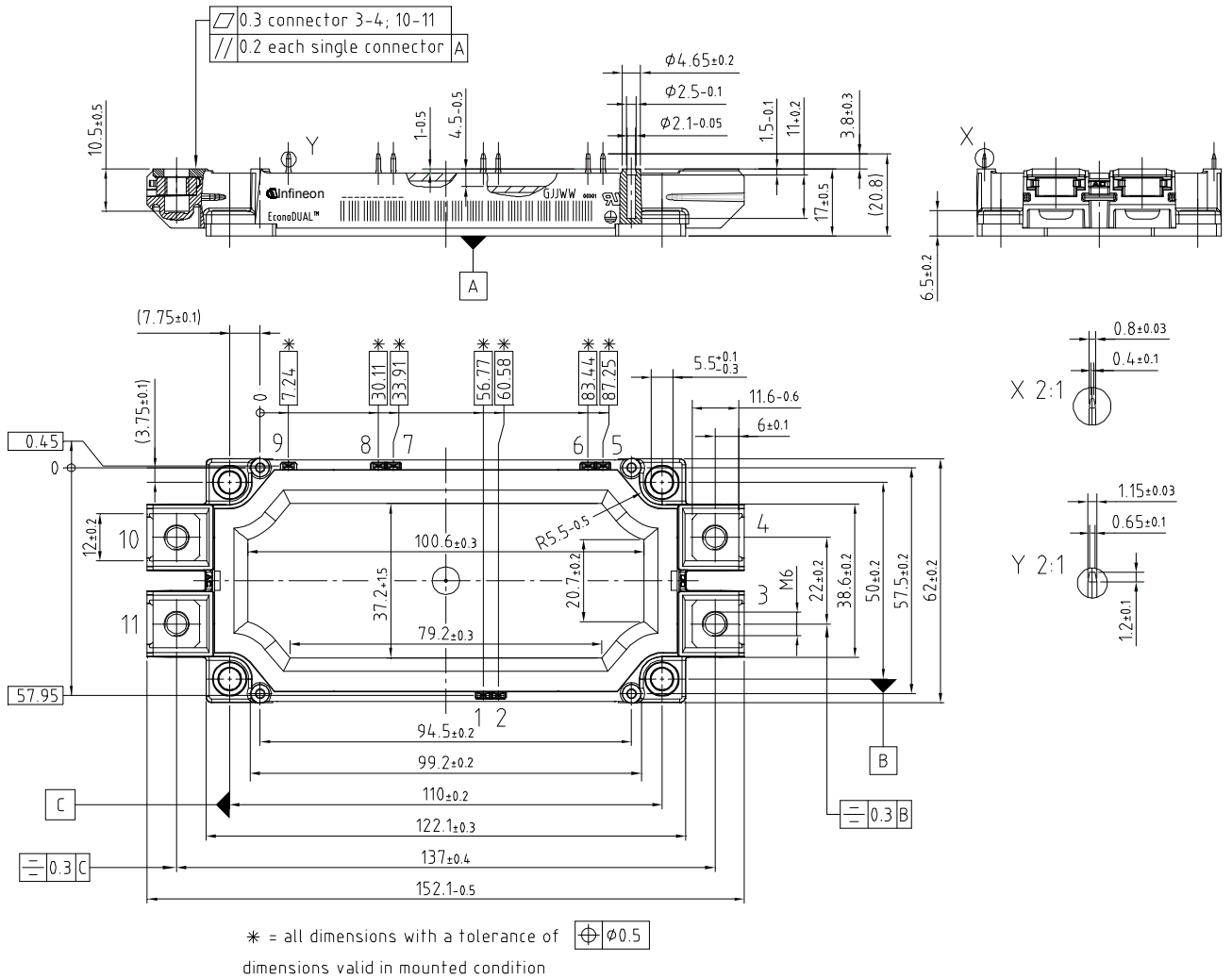
Isolations-Prüfspannung insulation test voltage	RMS, f = 50 Hz, t = 1 min.	V _{ISOL}	2,5		kV
Material Modulgrundplatte material of module baseplate			Cu		
Material für innere Isolation material for internal insulation			Al ₂ O ₃		
Kriechstrecke creepage distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal		14,5 13,0		mm
Luftstrecke clearance distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal		12,5 10,0		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}	0,009		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'}	1,10		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 M5 - Montage gem. gültiger Applikation Note screw M5 - 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	3,0	-	6,0 Nm
Gewicht weight		G		345	g

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Schaltplan / circuit diagram



Gehäuseabmessungen / package outlines



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