



# IGBT-Module

FS 300 R 12 KF4

Höchstzulässige Werte / Maximum rated values

Elektrische Eigenschaften / Electrical properties

Kollektor-Emitter-Sperrspannung	collector-emitter voltage		$V_{CES}$	1200 V
Kollektor-Dauergleichstrom	DC-collector current		$I_C$	300 A
Periodischer Kollektor Spitzenstrom	repetitive peak collector current	$t_p=1$ ms	$I_{CRM}$	600 A
Gesamt-Verlustleistung	total power dissipation	$t_c=25^\circ\text{C}$ , Transistor /transistor	$P_{tot}$	2000 W
Gate-Emitter-Spitzenspannung	gate-emitter peak voltage		$V_{GE}$	+/- 20 V
Dauergleichstrom	DC forward current		$I_F$	300 A
Periodischer Spitzenstrom	repetitive peak forw. current	$t_p=1$ ms	$I_{FRM}$	600 A
Isolations-Prüfspannung	insulation test voltage	RMS, f=50 Hz, t= 1 min.	$V_{ISOL}$	2,5 kV

## Charakteristische Werte / Characteristic values: Transistor

			min.	typ.	max.	
Kollektor-Emitter Sättigungsspannung	collector-emitter saturation voltage	$i_C=300\text{A}, v_{GE}=15\text{V}, t_{vj}=25^\circ\text{C}$	$v_{CE\ sat}$	-	2,7	3,2 V
		$i_C=300\text{A}, v_{GE}=15\text{V}, t_{vj}=125^\circ\text{C}$		-	3,3	3,9 V
Gate-Schwellenspannung	gate threshold voltage	$i_C=12\text{mA}, v_{CE}=v_{GE}, t_{vj}=25^\circ\text{C}$	$v_{GE(th)}$	4,5	5,5	6,5 V
Eingangskapazität	input capacity	$f_o=1\text{MHz}, t_{vj}=25^\circ\text{C}, v_{CE}=25\text{V}, v_{GE}=0\text{V}$	$C_{ies}$	-	22	- 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 mA
		$v_{CE}=1200\text{V}, v_{GE}=0\text{V}, t_{vj}=125^\circ\text{C}$		-	-	50 mA
Gate-Emitter Reststrom	gate leakage current	$v_{CE}=0\text{V}, v_{GE}=20\text{V}, t_{vj}=25^\circ\text{C}$	$i_{GES}$	-	-	400 nA
Emitter-Gate Reststrom	gate leakage current	$v_{CE}=0\text{V}, v_{EG}=20\text{V}, t_{vj}=25^\circ\text{C}$	$i_{EGS}$	-	-	400 nA
Einschaltzeit (induktive Last)	turn-on time (inductive load)	$i_C=300\text{A}, v_{CE}=600\text{V}$	$t_{on}$			
		$v_L = \pm 15\text{V}, R_G=6,8\Omega, t_{vj}=25^\circ\text{C}$		-	0,35	- $\mu\text{s}$
		$v_L = \pm 15\text{V}, R_G=6,8\Omega, t_{vj}=125^\circ\text{C}$		-	0,45	- $\mu\text{s}$
Speicherzeit (induktive Last)	storage time (inductive load)	$i_C=300\text{A}, v_{CE}=600\text{V}$	$t_s$			
		$v_L = \pm 15\text{V}, R_G=6,8\Omega, t_{vj}=25^\circ\text{C}$		-	0,9	- $\mu\text{s}$
		$v_L = \pm 15\text{V}, R_G=6,8\Omega, t_{vj}=125^\circ\text{C}$		-	1,0	- $\mu\text{s}$
Fallzeit (induktive Last)	fall time (inductive load)	$i_C=300\text{A}, v_{CE}=600\text{V}$	$t_f$			
		$v_L = \pm 15\text{V}, R_G=6,8\Omega, t_{vj}=25^\circ\text{C}$		-	0,10	- $\mu\text{s}$
		$v_L = \pm 15\text{V}, R_G=6,8\Omega, t_{vj}=125^\circ\text{C}$		-	0,15	- $\mu\text{s}$

## Charakteristische Werte / Characteristic values: Invers-Diode

Durchlaßspannung	forward voltage	$i_F=300\text{A}, v_{GE}=0\text{V}, t_{vj}=25^\circ\text{C}$	$V_F$	-	2,3	2,9 V
		$i_F=300\text{A}, v_{GE}=0\text{V}, t_{vj}=125^\circ\text{C}$		-	2,1	- V
Rückstromspitze	peak reverse recovery current	$i_F=300\text{A}, -di_F/dt=300\text{A}/\mu\text{s}$	$I_{RM}$			
		$v_{RM}=600\text{V}, v_{EG}=10\text{V}, t_{vj}=25^\circ\text{C}$		-	25	- A
Sperrverzögerungsladung	recovered charge	$v_{RM}=600\text{V}, v_{EG}=10\text{V}, t_{vj}=125^\circ\text{C}$		-	65	- A
		$i_F=300\text{A}, -di_F/dt=300\text{A}/\mu\text{s}$	$Q_r$			
		$v_{RM}=600\text{V}, v_{EG}=10\text{V}, t_{vj}=25^\circ\text{C}$		-	4	- $\mu\text{As}$
		$v_{RM}=600\text{V}, v_{EG}=10\text{V}, t_{vj}=125^\circ\text{C}$		-	20	- $\mu\text{As}$

## Thermische Eigenschaften / Thermal properties

Innerer Wärmewiderstand	thermal resistance, junction to case	Transistor,DC,pro Modul/per module	$R_{thJC}$		0,011 $^\circ\text{C}/\text{W}$
		Transistor,DC,pro Zweig/per arm			0,064 $^\circ\text{C}/\text{W}$
		Diode,DC, pro Modul/per module			0,023 $^\circ\text{C}/\text{W}$
		Diode,DC, pro Zweig/per arm			0,140 $^\circ\text{C}/\text{W}$
Übergangs-Wärmewiderstand	thermal resistance, case to heatsink	pro Modul / per Module pro Zweig / per arm	$R_{thCK}$	typ.	0,006 $^\circ\text{C}/\text{W}$ 0,036 $^\circ\text{C}/\text{W}$
Höchstzul. Sperrschichttemperatur	max. junction temperature		$t_{vj\ max}$		150 $^\circ\text{C}$
Betriebstemperatur	operating temperature	Transistor / transistor	$t_{c\ op}$		-40...+150 $^\circ\text{C}$
		Diode / diode	$t_{c\ op}$		-40...+125 $^\circ\text{C}$
Lagertemperatur	storage temperature		$t_{stg}$		-40...+125 $^\circ\text{C}$

## Mechanische Eigenschaften / Mechanical properties

Gehäuse, siehe Anlage	case, see appendix				
Innere Isolation	internal insulation				$\text{Al}_2\text{O}_3$
Anzugsdrehmoment f. mech. Befestigung	mounting torque		M1		3 Nm
Anzugsdrehmoment f. elektr. Anschlüsse	terminal connection torque	terminals M6	M2		5...6 Nm
Gewicht	weight		G		ca. 2300 g

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