Technische Information / Technical Information

IGBT-Module
IGBT-modules

FD401R17KF6C_B2

1700V IGBT Modul mit low loss IGBT der 2.ten Generation und softer Emitter Controlled Diode
1700V IGBT Module with low loss IGBT of 2nd generation and soft Emitter Controlled Diode

Vorläufige Daten
Preliminary Data

IGBT, Brems-Chopper / IGBT, Brake-Chopper

Höchstzulässige Werte / Maximum Rated Values

Kollektor-Emitter-Sperrspannung Collector-emitter voltage	T_{vj} = 25°C T_{vj} = 125°C	V_{CES}	1700 1700		V
Kollektor-Dauergleichstrom Continuous DC collector current	T_C = 80°C, $T_{vj\,max}$ = 150°C T_C = 25°C, $T_{vj\,max}$ = 150°C	$I_{C\,nom}$ I_C	400 650		A A
Periodischer Kollektor-Spitzenstrom Repetitive peak collector current	t_P = 1 ms	I_{CRM}	800		A
Gesamt-Verlustleistung Total power dissipation	T_C = 25°C, $T_{vj\,max}$ = 150	P_{tot}	3,15		kW
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 = 400 A, V_{GE} = 15 V I_C = 400 A, V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C	$V_{CE\,sat}$		2,60 3,10	3,10 3,60	V V
Gate-Schwellenspannung Gate threshold voltage	I_C = 30,0 mA, V_{CE} = V_{GE}, T_{vj} = 25°C		V_{GEth}	4,5	5,5	6,5	V
Gateladung Gate charge	V_{GE} = -15 V ... +15 V		Q_G		4,80		µC
Interner Gatewiderstand Internal gate resistor	T_{vj} = 25°C		R_{Gint}		2,6		Ω
Eingangskapazität Input capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		27,0		nF
Rückwirkungskapazität Reverse transfer capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{res}		1,30		nF
Kollektor-Emitter-Reststrom Collector-emitter cut-off current	V_{CE} = 1700 V, V_{GE} = 0 V, T_{vj} = 25°C		I_{CES}			5,0	mA
Gate-Emitter-Reststrom Gate-emitter leakage current	V_{CE} = 0 V, V_{GE} = 20 V, T_{vj} = 25°C		I_{GES}			400	nA
Einschaltverzögerungszeit, induktive Last Turn-on delay time, inductive load	I_C = 400 A, V_{CE} = 900 V V_{GE} = ±15 V R_{Gon} = 1,8 Ω	T_{vj} = 25°C T_{vj} = 125°C	$t_{d\,on}$		0,40 0,40		µs µs
Anstiegszeit, induktive Last Rise time, inductive load	I_C = 400 A, V_{CE} = 900 V V_{GE} = ±15 V R_{Gon} = 1,8 Ω	T_{vj} = 25°C T_{vj} = 125°C	t_r		0,15 0,15		µs µs
Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load	I_C = 400 A, V_{CE} = 900 V V_{GE} = ±15 V R_{Goff} = 3,6 Ω	T_{vj} = 25°C T_{vj} = 125°C	$t_{d\,off}$		1,10 1,10		µs µs
Fallzeit, induktive Last Fall time, inductive load	I_C = 400 A, V_{CE} = 900 V V_{GE} = ±15 V R_{Goff} = 3,6 Ω	T_{vj} = 25°C T_{vj} = 125°C	t_f		0,10 0,11		µs µs
Einschaltverlustenergie pro Puls Turn-on energy loss per pulse	I_C = 400 A, V_{CE} = 900 V, L_S = 60 nH V_{GE} = ±15 V R_{Gon} = 1,8 Ω	T_{vj} = 25°C T_{vj} = 125°C	E_{on}		190		mJ mJ
Abschaltverlustenergie pro Puls Turn-off energy loss per pulse	I_C = 400 A, V_{CE} = 900 V, L_S = 60 nH V_{GE} = ±15 V R_{Goff} = 3,6 Ω	T_{vj} = 25°C T_{vj} = 125°C	E_{off}		150		mJ mJ
Kurzschlußverhalten SC data	$V_{GE} \leq$ 15 V, V_{CC} = 1000 V $V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$	$t_P \leq$ 10 µs, T_{vj} = 125°C	I_{SC}		1600		A
Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case	pro IGBT / per IGBT		R_{thJC}			40,0	K/kW
Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink	pro IGBT / per IGBT λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)		R_{thCH}		64,0		K/kW
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\,op}$	-40		125	°C

prepared by: HS	date of publication: 2013-10-02
approved by: TS	revision: 2.1

Vorläufige Daten
Preliminary Data

Diode, Brems-Chopper / Diode, Brake-Chopper

Höchstzulässige Werte / Maximum Rated Values

Periodische Spitzensperrspannung Repetitive peak reverse voltage	T_{vj} = 25°C T_{vj} = 125°C	V_{RRM}	1700 1700	V
Dauergleichstrom Continuous DC forward current		I_F	400	A
Periodischer Spitzenstrom Repetitive peak forward current	t_P = 1 ms	I_{FRM}	800	A
Grenzlastintegral I²t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C	I²t	45,0	kA²s
Mindesteinschaltdauer Minimum turn-on time		$t_{on\ min}$	10,0	µs

Charakteristische Werte / Characteristic Values

			min.	typ.	max.	
Durchlassspannung Forward voltage	I_F = 400 A, V_{GE} = 0 V I_F = 400 A, V_{GE} = 0 V	V_F		2,10 2,10	2,50 2,50	V V
Rückstromspitze Peak reverse recovery current	I_F = 400 A, - di_F/dt = 2400 A/µs (T_{vj}=125°C) V_R = 900 V V_{GE} = -15 V	I_{RM}		270 320		A A
Sperrverzögerungsladung Recovered charge	I_F = 400 A, - di_F/dt = 2400 A/µs (T_{vj}=125°C) V_R = 900 V V_{GE} = -15 V	Q_r		75,0 145		µC µC
Abschaltenergie pro Puls Reverse recovery energy	I_F = 400 A, - di_F/dt = 2400 A/µs (T_{vj}=125°C) V_R = 900 V V_{GE} = -15 V	E_{rec}		35,0 70,0		mJ mJ
Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case	pro Diode / per diode	R_{thJC}			68,0	K/kW
Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink	pro Diode / per diode λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)	R_{thCH}		110		K/kW
Temperatur im Schaltbetrieb Temperature under switching conditions		$T_{vj\ op}$	-40		125	°C