2 IGBT,Inverter

2.1 Maximum Rated Values

Parameter	Conditions	Symbol	Value	Unit
Collector-emitter voltage	T_{vj} = 25°C	V_{CES}	750	V
Implemented collector current		I_{CN}	900	A
Continuous DC collector current	T_F = 105°C, $T_{vj\,max}$ = 175°C	$I_{C\,nom}$	550	A
Repetitive peak collector current	t_P = 1 ms	I_{CRM}	1800	A
Total power dissipation	T_F = 25°C, $T_{vj\,max}$ = 175°C	P_{tot}	1546	W
Gate-emitter peak voltage		V_{GES}	+/-20	V

2.2 Characteristic Values

				min.	typ.	max.	
Collector-emitter saturation voltage	I_C = 550 A, V_{GE} = 15 V I_C = 550 A, V_{GE} = 15 V I_C = 550 A, V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$V_{CE\,sat}$		1.10 1.10 1.10	1.25	V
Gate threshold voltage	I_C = 13.0 mA, V_{CE} = V_{GE}	T_{vj} = 25°C	V_{GEth}	4.90	5.80	6.50	V
Gate charge	V_{GE} = -8 V ... 15 V, V_{CE} = 400V		Q_G		5.80		µC
Internal gate resistor		T_{vj} = 25°C	R_{Gint}		0.5		Ω
Input capacitance	f = 1 MHz, V_{CE} = 25 V, V_{GE} = 0 V	T_{vj} = 25°C	C_{ies}		105		nF
Reverse transfer capacitance	f = 1 MHz, V_{CE} = 25 V, V_{GE} = 0 V	T_{vj} = 25°C	C_{res}		0.50		nF
Collector-emitter cut-off current	V_{CE} = 450 V, V_{GE} = 0 V	T_{vj} = 25°C	I_{CES}			0.5	mA
Gate-emitter leakage current	V_{CE} = 0 V, V_{GE} = 20 V	T_{vj} = 25°C	I_{GES}			400	nA
Turn-on delay time, inductive load	I_C = 550 A, V_{CE} = 400 V V_{GE} = -8 V / +15 V R_{Gon} = 3.3 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,on}$		0.39 0.39 0.39		µs
Rise time, inductive load	I_C = 550 A, V_{CE} = 400 V V_{GE} = -8 V / +15 V R_{Gon} = 3.3 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_r		0.09 0.11 0.11		µs
Turn-off delay time, inductive load	I_C = 550 A, V_{CE} = 400 V V_{GE} = -8 V / +15 V R_{Goff} = 2.0 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,off}$		0.63 0.71 0.74		µs
Fall time, inductive load	I_C = 550 A, V_{CE} = 400 V V_{GE} = -8 V / +15 V R_{Goff} = 2.0 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_f		0.06 0.08 0.08		µs
Turn-on energy loss per pulse	I_C = 550 A, V_{CE} = 400 V, L_S = 20 nH V_{GE} = -8 V / +15 V R_{Gon} = 3.3 Ω di/dt (T_{vj} = 150°C) = 4100 A/µs	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{on}		21.0 29.0 30.5		mJ
Turn-off energy loss per pulse	I_C = 550 A, V_{CE} = 400 V, L_S = 20 nH V_{GE} = -8 V / +15 V R_{Goff} = 2.0 Ω dv/dt (T_{vj} = 150°C) = 2600 V/µs	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{off}		27.5 36.0 38.5		mJ
SC data	$V_{GE} \leq$ 15 V, V_{CC} = 400 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	$t_P \leq$ 4 µs, T_{vj} = 150°C	I_{SC}		4500		A
Thermal resistance, junction to cooling fluid	per IGBT; ΔV/Δt = 10 dm³/min		R_{thJF}			0.097	K/W
Temperature under switching conditions	t_{op} continuous $t_{op\,max}$ 30h over life time, for 10s within period of 10min		$T_{vj\,op}$	-40 150		150 175	°C

3 Diode, Inverter

3.1 Maximum Rated Values

Parameter	Conditions	Symbol	Value	Unit
Repetitive peak reverse voltage	T_{vj} = 25°C	V_{RRM}	750	V
Implemented forward current		I_{FN}	860	A
Continuous DC forward current		I_F	550	A
Repetitive peak forward current	t_P = 1 ms	I_{FRM}	1720	A
I^2t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C V_R = 0 V, t_P = 10 ms, T_{vj} = 150°C	I^2t	19500 19000	A^2s A^2s

3.2 Characteristic Values

			min.	typ.	max.	
Forward voltage	I_F = 550 A, V_{GE} = 0 V I_F = 550 A, V_{GE} = 0 V I_F = 550 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	V_F		1.40 1.30 1.25	1.65	V
Peak reverse recovery current	I_F = 550 A, - di_F/dt = 4100 A/µs (T_{vj} = 150°C) V_R = 400 V V_{GE} = -8 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	I_{RM}		265 385 420		A
Recovered charge	I_F = 550 A, - di_F/dt = 4100 A/µs (T_{vj} = 150°C) V_R = 400 V V_{GE} = -8 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	Q_r		23.0 49.5 58.5		µC
Reverse recovery energy	I_F = 550 A, - di_F/dt = 4100 A/µs (T_{vj} = 150°C) V_R = 400 V V_{GE} = -8 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{rec}		7.20 15.0 17.5		mJ
Thermal resistance, junction to cooling fluid	per diode; $\Delta V/\Delta t$ = 10 dm³/min		R_{thJF}			0.125	K/W
Temperature under switching conditions	t_{op} continuous $t_{op\,max}$ 30h over life time, for 10s within period of 10min		$T_{vj\,op}$	-40 150		150 175	°C

4 NTC-Thermistor

Parameter	Conditions	Symbol	min.	typ.	max.	Unit
			Value			
Rated resistance	T_C = 25°C	R_{25}		5.00		kΩ
Deviation of R100	T_C = 100°C, R_{100} = 493 Ω	$\Delta R/R$	5		5	%
Power dissipation	T_C = 25°C	P_{25}			20.0	mW
B-value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298{,}15\ K))]$	$B_{25/50}$		3375		K
B-value	$R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298{,}15\ K))]$	$B_{25/80}$		3411		K
B-value	$R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298{,}15\ K))]$	$B_{25/100}$		3433		K

Specification according to the valid application note.