

Electrical Features

- Trench/Fieldstop IGBT
- V_{CEsat} with positive Temperature Coefficient
- Low V_{CEsat}

Typical Applications

- Auxiliary inverters
- Motor drives
- Servo drives



Mechanical Features

- High power density
- Integrated NTC temperature sensor
- Copper base plate
- Solder contact technology
- Standard housing

IGBT, Inverter

Maximum Rated Values							
Symbol	Item	Conditions		Rating		Unit	
IGBT							
V _{CES}	Collector-emitter voltage	T _{vj} =25°C		1200		V	
V _{GES}	Gate-emitter voltage	-		±20		V	
I _C	Collector current,DC	T _C =100°C,T _{vj} =175°C		75		A	
I _{CRM}	Repetitive peak collector current	t _p =1ms		150		A	
P _{tot}	Total power dissipation	T _C =25°C,T _{vj} =175°C		384		W	
Characteristics Values							
Symbol	Item	Conditions		Values			Unit
IGBT				Min.	Typ.	Max.	
I _{CES}	Collector-emitter cut-off current	V _{CE} =1200V,V _{GE} =0V,T _{vj} =25°C		-	-	1	mA
I _{GES}	Gate leakage current	V _{CE} =0V,V _{GE} =20V,T _{vj} =25°C		-	-	500	nA
V _{GE(th)}	Gate-emitter threshold voltage	I _C =2.4mA,V _{CE} =V _{GE} ,T _{vj} =25°C		5.2	5.60	6.2	V
V _{CESat}	Collector-emitter saturation voltage	I _C =75A V _{GE} =15V	T _{vj} =25°C	-	1.98	-	V
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
C _{ies}	Input capacitance	V _{CE} =25V,V _{GE} =0V f=1MHz,T _{vj} =25°C		-	5.30	-	nF
C _{oes}	Output capacitance			-	0.35	-	
C _{res}	Reverse transfer capacitance			-	0.18	-	
Q _G	Gate charge	V _{GE} =-15...+15V,T _{vj} =25°C		-	-	-	uC
R _g	Internal gate resistance	T _{vj} =25°C		-	2.4	-	Ω

t _{d(on)}	Turn-on delay time	V _{CC} =600V I _C =75A V _{GE} =±15V R _{G(on)} =10Ω R _{G(off)} =10Ω	T _{vj} =25°C	-	45.6	-	ns
t _r	Rise time		T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
			T _{vj} =25°C	-	57.2	-	
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
t _{d(off)}	Turn-off delay time		T _{vj} =25°C	-	344.5	-	
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
t _f	Fall time		T _{vj} =25°C	-	202.1	-	
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
E _{on}	Turn-on energy (per pulse)		T _{vj} =25°C	-	9.64	-	
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
E _{off}	Turn-off energy (per pulse)		T _{vj} =25°C	-	4.15	-	
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
SC data	Short-circuit current	V _{CC} =600V,V _{GE} ≤15V,T _{vj} =150°C V _{CES} ≤1200V,t _p ≤10μs		-	451	-	A
R _{thJC}	Thermal resistance,junction to case	Per IGBT		-	-	0.39	K/W
R _{thCH}	Thermalresistance,case to heatsink	Per IGBT λgrease=1W/(m·K)		-	0.13	-	K/W
T _{vjop}	Temperature under switching conditions			-40		150	°C

Diode, Inverter**Maximum Rated Values**

Symbol	Item	Conditions	Rating	Unit
V_{RRM}	Repetitive peak reverse voltage	$T_{vj}=25^{\circ}C$	1200	V
I_F	Forward current, DC		75	A
I_{FRM}	Repetitive peak forward current	$t_p=1ms$	150	A
I^2t	I^2t -value	$V_R=0V, t_p=10ms, T_{vj}=150^{\circ}C$	960	A^2s

Characteristic Values

Characteristic Values							
V _F	Continuous forward voltage	I _F =75A V _{GE} =0V	T _{vj} =25°C	-	2.13	-	V
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
I _{RM}	Peak reverse recovery current	V _R =600V I _F =75A V _{GE} =-15V	T _{vj} =25°C	-	65.09	-	A
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
t _{rr}	Reverse recovery time		T _{vj} =25°C	-	143.9	-	ns
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
Q _r	Repetitive peak forward current		T _{vj} =25°C	-	3.83	-	μC
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	

E_{rec}	Recovered charge		$T_{vj}=25^{\circ}\text{C}$	-	0.65	-	mJ
			$T_{vj}=125^{\circ}\text{C}$	-	-	-	
			$T_{vj}=150^{\circ}\text{C}$	-	-	-	
R_{thJC}	Thermal resistance, junction to case	per diode		-	-	0.62	K/W
R_{thCH}	Thermal resistance, case to heatsink	per diode, $\lambda_{grease}=1\text{ W}/(\text{m} \cdot \text{K})$		-	0.205	-	K/W
T_{vjop}	Temperature under switching conditions			-40		150	$^{\circ}\text{C}$

Diode, Rectifier

Maximum Rated Values							
Symbol	Item	Conditions		Rating		Unit	
V _{RRM}	Repetitive peak reverse voltage	T _{vj} =25°C		1600		V	
I _{FRMSM}	Maximum RMS forward current per chip	T _C =80°C,T _{vj} =175°C		75		A	
I _{RMSM}	Maximum RMS current at rectifier output	T _C = 80°C		150		A	
I _{FSM}	Surge forward current	tp = 10 ms, Tvj = 150° C		470		A	
I²t	I²t-value	V _R =0V,tp=10ms,Tvj=150°C		1100		A²s	
Characteristic Values							
Symbol	Item	Conditions		Values			Unit
				Min.	Typ.	Max.	
V _F	Continuous forward voltage	I _F =75A V _{GE} =0V	Tvj=25°C	-	1.22	-	V
			Tvj=125°C	-	-	-	
			Tvj=150°C	-	-	-	
I _R	Reverse current	V _R =1600V	Tvj=25°C	-	2.61	-	uA
			Tvj=125°C	-	-	-	
			Tvj=150°C	-	-	-	
Tvjop	Temperature under switching conditions			-40		150	°C

IGBT, Brake-Chopper

Maximum Rated Values						
Symbol	Item	Conditions	Values			Unit
V _{CES}	Collector-emitter voltage	T _{vj} =25°C	1200			V
V _{GES}	Gate-emitter voltage	-	±20			V
I _C	Collector current,DC	T _C =100°C,T _{vj} =175°C	50			A
I _{CRM}	Repetitive peak collector current	t _p =1ms	100			A
P _{tot}	Total power dissipation	T _C =25°C,T _{vj} =175°C	278			W
Characteristic Values						
Symbol	Item	Conditions	Values			Unit
IGBT			Min.	Typ.	Max.	
I _{CES}	Collector-emitter cut-off current	V _{CE} =1200V,V _{GE} =0V,T _{vj} =25°C	-	-	1	mA
I _{GES}	Gate leakage current	V _{CE} =0V,V _{GE} =20V,T _{vj} =25°C	-	-	500	nA
V _{GE(th)}	Gate-emitter threshold voltage	I _C =1.5mA,V _{CE} =V _{GE} ,T _{vj} =25°C	5.2	5.4	6.2	V
V _{CEsat}	Collector-emitter saturation voltage	I _C =50A T _{vi} =25°C	-	2.29	-	

		V _{GE} =15V	T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
C _{ies}	Input capacitance	V _{CE} =25V, V _{GE} =0V f=1MHz, T _{vj} =25°C		-	3.15	-	pF
C _{oes}	Output capacitance			-	0.18	-	
C _{res}	Reverse transfer capacitance			-	0.103	-	
Q _G	Gate charge	V _{CC} =600V, I _C =50A V _{GE} =-15...+15V, T _{vj} =25°C		-	240	-	nC
R _g	Internal gate resistance	T _{vj} =25°C		-	0	-	Ω
t _{d(on)}	Turn-on delay time	V _{CC} =600V I _C =50A V _{GE} =±15V R _{G(on)} =10Ω R _{G(off)} =10Ω	T _{vj} =25°C	-	3.08	-	ns
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
t _r	Rise time		T _{vj} =25°C	-	30.5	-	
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
t _{d(off)}	Turn-off delay time		T _{vj} =25°C	-	198.9	-	
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
t _f	Fall time		T _{vj} =25°C	-	187.6	-	mJ
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
E _{on}	Turn-on energy (per pulse)		T _{vj} =25°C	-	3.39	-	
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
E _{off}	Turn-off energy (per pulse)		T _{vj} =25°C	-	2.11	-	mJ
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
SC data	Short-circuit current	V _{CC} =600V, V _{GE} ≤15V, T _{vj} =150°C V _{CES} ≤1200V, t _p ≤10μs		-	223	-	A
R _{thJC}	Thermal resistance, junction to case	Per IGBT		-	-	0.54	K/W
R _{thCH}	Thermal resistance, case to heatsink	Per IGBT λgrease=1 W/(m·K)		-	0.245	-	K/W
T _{vjop}	Temperature under switching conditions			-40		150	°C

Diode, Brake-Chopper**Maximum Rated Values**

Symbol	Item	Conditions	Rating	Unit
V _{RRM}	Repetitive peak reverse voltage	T _{vj} =25°C	1200	V
I _F	Forward current, DC		25	A
I _{FRM}	Repetitive peak forward current	t _p =1ms	50	A
I ² t	I ² t-value	V _R =0V, t _p =10ms, T _{vj} =125°C	90	A ² s

Characteristic Values

V _F	Continuous forward voltage	I _F =25A V _{GE} =0V	T _{vj} =25°C	-	2.17	-	V
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
I _{RM}	Peak reverse recovery current	V _R =600V	T _{vj} =25°C	-	58.2	-	A

		I _F =50A V _{GE} =-15V	T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
t _{rr}	Reverse recovery time		T _{vj} =25°C	-	62.6	-	ns
			T _{vj} =125°C	-	-	-	
Q _r	Repetitive peak forward current		T _{vj} =25°C	-	1.95	-	μC
			T _{vj} =125°C	-	-	-	
E _{rec}	Recovered charge		T _{vj} =25°C	-	0.14	-	mJ
			T _{vj} =125°C	-	-	-	
R _{thJC}	Thermal resistance, junction to case	per diode		-	-	1.35	K/W
R _{thCH}	Thermal resistance, case to heatsink	per diode, λ _{grease} =1 W/(m • K)		-	0.61	-	K/W
T _{vjop}	Temperature under switching conditions			-40		150	°C

Note:

IGBT electrical characteristics according to IEC 60747 – 9

Diode electrical characteristics according to IEC 60747 – 2

NTC Thermistor Characteristics

Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
R_{25}	Rated resistance	$T_C=25^{\circ}C$	-	5	-	k Ω
$\Delta R/R$	Deviation of resistance	$T_C=100^{\circ}C, R_{100}=477\Omega$	-5	-	5	%
P_{25}	Power dissipation	$T_C=25^{\circ}C$	-	-	20	mW
$B_{25/50}$	B-constant	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$	-	3375	-	K
$B_{25/80}$	B-constant	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))]$	-	3411	-	
$B_{25/100}$	B-constant	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298.15K))]$	-	3433	-	

Module

Symbol	Item	Conditions	Rating			Unit
V_{ISOL}	Isolation voltage	Terminals to baseplate, RMS, $f=50Hz, t=1min$	2500			V
$T_{vj\ max}$	Maximum junction temperature	-	175			$^{\circ}C$
$T_{vj\ op}$	Operating junction temperature	Continuous operation(underswitching)	-40~150			$^{\circ}C$
T_{stg}	Storage temperature	-	-40~125			$^{\circ}C$
Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
M	Mounting torque for module mounting	-	3	-	6	Nm
ds	Creepage distance	Terminal to terminal	-	-	-	mm
		Terminal to base plate	-	10	-	
da	Clearance	Terminal to terminal	-	-	-	mm
		Terminal to base plate	-	7.5	-	
m	Weight	-	-	290	-	g

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