

Thermal Resistance

Parameter	Symbol	Conditions	Max. Value	Unit
Characteristic				
IGBT thermal resistance, junction – case	R_{thJC}		0.65	K/W
Diode thermal resistance, junction – case	R_{thJCD}		1.0	
Thermal resistance, junction – ambient	R_{thJA}		40	

Electrical Characteristic, at $T_j = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Static Characteristic						
Collector-emitter breakdown voltage	$V_{(BR)CES}$	$V_{GE}=0V, I_C=500\mu A$	1200	-	-	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$V_{GE} = 15V, I_C=25A$ $T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$ $T_j=150^\circ\text{C}$	- - -	1.7 2.0 2.2	2.2 - -	
Diode forward voltage	V_F	$V_{GE}=0V, I_F=25A$ $T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$ $T_j=150^\circ\text{C}$	- - -	1.7 1.7 1.7	2.2 - -	
Gate-emitter threshold voltage	$V_{GE(th)}$	$I_C=1mA,$ $V_{CE}=V_{GE}$	5.0	5.8	6.5	
Zero gate voltage collector current	I_{CES}	$V_{CE}=1200V,$ $V_{GE}=0V$ $T_j=25^\circ\text{C}$ $T_j=150^\circ\text{C}$	- -	- -	0.25 2.5	mA
Gate-emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V$	-	-	600	
Transconductance	g_{fs}	$V_{CE}=20V, I_C=25A$	-	16	-	S
Integrated gate resistor	R_{Gint}			8		Ω

Dynamic Characteristic

Input capacitance	C_{iss}	$V_{CE}=25V,$	-	1860	-	pF
Output capacitance	C_{oss}	$V_{GE}=0V,$	-	96	-	
Reverse transfer capacitance	C_{rss}	$f=1MHz$	-	82	-	
Gate charge	Q_{Gate}	$V_{CC}=960V, I_C=25A$ $V_{GE}=15V$	-	155	-	nC
Internal emitter inductance measured 5mm (0.197 in.) from case	L_E		-	13	-	nH
Short circuit collector current ¹⁾	$I_{C(SC)}$	$V_{GE}=15V, t_{SC} \leq 10\mu s$ $V_{CC} = 600V,$ $T_j = 25^\circ C$	-	150	-	A

Switching Characteristic, Inductive Load, at $T_j=25^\circ C$

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	

IGBT Characteristic

Turn-on delay time	$t_{d(on)}$	$T_j=25^\circ C,$ $V_{CC}=600V, I_C=25A$ $V_{GE}=0/15V,$ $R_G=22\Omega,$ $L_\sigma^{2)}=180nH,$ $C_\sigma^{2)}=39pF$ Energy losses include "tail" and diode reverse recovery.	-	50	-	ns
Rise time	t_r		-	30	-	
Turn-off delay time	$t_{d(off)}$		-	560	-	
Fall time	t_f		-	70	-	
Turn-on energy	E_{on}		-	2.0	-	mJ
Turn-off energy	E_{off}		-	2.2	-	
Total switching energy	E_{ts}		-	4.2	-	

Anti-Parallel Diode Characteristic

Diode reverse recovery time	t_{rr}	$T_j=25^\circ C,$	-	200	-	ns
Diode reverse recovery charge	Q_{rr}	$V_R=600V, I_F=25A,$	-	2.3	-	μC
Diode peak reverse recovery current	I_{rrm}	$di_F/dt=800A/\mu s$	-	21	-	A
Diode peak rate of fall of reverse recovery current during t_b	di_{rr}/dt		-	390	-	$A/\mu s$

¹⁾ Allowed number of short circuits: <1000; time between short circuits: >1s.

²⁾ Leakage inductance L_σ and Stray capacity C_σ due to dynamic test circuit in Figure E.