

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units	
Outer IGBT							
Off Characteristics							
BV_{CES}	Collector-Emitter Breakdown Voltage	$V_{GE} = 0\text{ V}, I_C = 1\text{ mA}$	650	-	-	V	
I_{CES}	Collector Cut-off Current	$V_{CE} = V_{CES}, V_{GE} = 0\text{ V}$	-	-	250	μA	
I_{GES}	Gate-Emitter Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0\text{ V}$	-	-	2	μA	
On Characteristics							
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$V_{GE} = V_{CE}, I_C = 30\text{ mA}$	4.5	5.6	6.7	V	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 30\text{ A}, V_{GE} = 15\text{ V}$	-	1.55	2.2	V	
		$I_C = 30\text{ A}, V_{GE} = 15\text{ V} @ T_C = 125^\circ\text{C}$	-	1.75	-	V	
		$I_C = 60\text{ A}, V_{GE} = 15\text{ V}$	-	2.13	-	V	
Switching Characteristics							
$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 300\text{ V}$ $I_C = 30\text{ A}$ $V_{GE} = \pm 15\text{ V}$ $R_G = 20\ \Omega$ Inductive Load $T_C = 25^\circ\text{C}$	-	33	-	ns	
t_r	Rise Time		-	43	-	ns	
$t_{d(off)}$	Turn-Off Delay Time		-	197	-	ns	
t_f	Fall Time		-	17	-	ns	
E_{ON}	Turn-On Switching Loss per Pulse		-	0.68	-	mJ	
E_{OFF}	Turn-Off Switching Loss per Pulse		-	0.38	-	mJ	
$t_{d(on)}$	Turn-On Delay Time		$V_{CC} = 300\text{ V}$ $I_C = 30\text{ A}$ $V_{GE} = \pm 15\text{ V}$ $R_G = 20\ \Omega$ Inductive Load $T_C = 125^\circ\text{C}$	-	29	-	ns
t_r	Rise Time			-	50	-	ns
$t_{d(off)}$	Turn-Off Delay Time			-	205	-	ns
t_f	Fall Time			-	25	-	ns
E_{ON}	Turn-On Switching Loss per Pulse	-		0.86	-	mJ	
E_{OFF}	Turn-Off Switching Loss per Pulse	-		0.52	-	mJ	
Q_g	Total Gate Charge	$V_{CC} = 300\text{ V}, I_C = 30\text{ A}, V_{GE} = \pm 15\text{ V}$		-	0.26	-	μC
$R_{\theta JC}$	Thermal Resistance of Junction to Case	per Chip		-	-	1.11	$^\circ\text{C/W}$
Inner IGBT							
Off Characteristics							
BV_{CES}	Collector-Emitter Breakdown Voltage	$V_{GE} = 0\text{ V}, I_C = 1\text{ mA}$	650	-	-	V	
I_{CES}	Collector Cut-off Current	$V_{CE} = V_{CES}, V_{GE} = 0\text{ V}$	-	-	250	μA	
I_{GES}	Gate-Emitter Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0\text{ V}$	-	-	2	μA	
On Characteristics							
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$V_{GE} = V_{CE}, I_C = 50\text{ mA}$	4.5	5.6	6.7	V	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 50\text{ A}, V_{GE} = 15\text{ V}$	-	1.65	2.3	V	
		$I_C = 50\text{ A}, V_{GE} = 15\text{ V} @ T_C = 125^\circ\text{C}$	-	1.95	-	V	
		$I_C = 100\text{ A}, V_{GE} = 15\text{ V}$	-	2.49	-	V	
Switching Characteristics							
$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 300\text{ V}$ $I_C = 50\text{ A}$ $V_{GE} = \pm 15\text{ V}$ $R_G = 15\ \Omega$ Inductive Load $T_C = 25^\circ\text{C}$	-	41	-	ns	
t_r	Rise Time		-	65	-	ns	
$t_{d(off)}$	Turn-Off Delay Time		-	233	-	ns	
t_f	Fall Time		-	18	-	ns	
E_{ON}	Turn-On Switching Loss per Pulse		-	0.87	-	mJ	
E_{OFF}	Turn-Off Switching Loss per Pulse		-	0.77	-	mJ	
$t_{d(on)}$	Turn-On Delay Time		$V_{CC} = 300\text{ V}$ $I_C = 50\text{ A}$ $V_{GE} = \pm 15\text{ V}$ $R_G = 15\ \Omega$ Inductive Load $T_C = 125^\circ\text{C}$	-	39	-	ns
t_r	Rise Time			-	76	-	ns
$t_{d(off)}$	Turn-Off Delay Time			-	243	-	ns
t_f	Fall Time			-	20	-	ns
E_{ON}	Turn-On Switching Loss per Pulse	-		0.99	-	mJ	
E_{OFF}	Turn-Off Switching Loss per Pulse	-		0.93	-	mJ	
Q_g	Total Gate Charge	$V_{CC} = 300\text{ V}, I_C = 50\text{ A}, V_{GE} = \pm 15\text{ V}$		-	0.39	-	nC
$R_{\theta JC}$	Thermal Resistance of Junction to Case	per Chip		-	-	0.86	$^\circ\text{C/W}$

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Diode						
V_{FM}	Diode Forward Voltage	$I_F = 15\text{ A}$	-	2.75	3.4	V
		$I_F = 15\text{ A @ }T_C = 125^\circ\text{C}$	-	1.78	-	V
I_R	Reverse Leakage Current	$V_R = 650\text{ V}$	-	-	250	μA
t_{rr}	Reverse Recovery Time	$V_R = 300\text{ V}, I_F = 15\text{ A}$ $di_F / dt = 700\text{ A/us}$ $T_C = 25^\circ\text{C}$	-	23	-	ns
I_{rr}	Reverse Recovery Current		-	9.9	-	A
Q_{rr}	Reverse Recovery Charge		-	113	-	nC
t_{rr}	Reverse Recovery Time	$V_R = 300\text{ V}, I_F = 15\text{ A}$ $di_F / dt = 700\text{ A/us}$ $T_C = 125^\circ\text{C}$	-	49	-	ns
I_{rr}	Reverse Recovery Current		-	15.2	-	A
Q_{rr}	Reverse Recovery Charge		-	366	-	nC
$R_{\theta JC}$	Thermal Resistance of Junction to Case	per Chip	-	-	1.44	$^\circ\text{C/W}$
NTC_ Thermistor						
R_{NTC}	Rated Resistance	$T_C = 25^\circ\text{C}$	-	5.0	-	k Ω
		$T_C = 100^\circ\text{C}$	-	493	-	Ω
	Tolerance	$T_C = 25^\circ\text{C}$	- 5	-	+ 5	%
P_D	Power Dissipation	$T_C = 25^\circ\text{C}$	-	-	20	mW
B_{Value}	B-Constance	$B_{25/50}$	-	3375	-	K
		$B_{25/100}$	-	3436	-	K