

Electrical Characteristics ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
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Off Characteristics

BV_{CES}	Collector-Emitter Breakdown Voltage	$V_{GE} = 0V, I_C = 250\mu A$	600	-	-	V
$\frac{\Delta BV_{CES}}{\Delta T_J}$	Temperature Coeff. of Breakdown Voltage	$V_{GE} = 0V, I_C = 1mA$	-	0.6	-	V
I_{CES}	Collector Cut-off Current	$V_{CE} = V_{CES}, V_{GE} = 0V$	-	-	250	μA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0V$	-	-	± 100	nA

On Characteristics

$V_{GE(th)}$	G-E Threshold Voltage	$V_{GE} = 0V, I_C = 50mA$	5.0	6.0	8.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C = 50A, V_{GE} = 15V$	-	2.2	2.8	V

Dynamic Characteristics

C_{ies}	Input Capacitance	$V_{CE} = 30V, V_{GE} = 0V,$ $f = 1MHz$		2920		pF
C_{oes}	Output Capacitance			400		pF
C_{res}	Reverse Capacitance			75		pF

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 300V, I_C = 50A,$ $R_G = 5.9\Omega, V_{GE} = 15V$ Inductive Load, $T_C = 25^\circ\text{C}$	-	58	-	ns
t_r	Rise Time		-	40	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	107	-	ns
t_f	Fall Time		-	140	-	ns
E_{on}	Turn-On Switching Loss		-	0.75	-	mJ
E_{off}	Turn-Off Switching Loss		-	0.54	-	mJ
E_{ts}	Total Switching Loss		-	1.29	-	mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 300V, I_C = 50A,$ $R_G = 5.9\Omega, V_{GE} = 15V$ Inductive Load, $T_C = 125^\circ\text{C}$	-	53	-	ns
t_r	Rise Time		-	40	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	106	-	ns
t_f	Fall Time		-	274	-	ns
E_{on}	Turn-On Switching Loss		-	1.09	-	mJ
E_{off}	Turn-Off Switching Loss		-	1.68	-	mJ
E_{ts}	Total Switching Loss		-	2.77	-	mJ
T_{sc}	Short Circuit Withstand Time	$V_{CC} = 300V, V_{GE} = 15V @ T_C = 100^\circ\text{C}$	10	-	-	μs
Q_g	Total Gate Charge	$V_{CE} = 300V, I_C = 50A, V_{GE} = 15V$	-	136	-	nC
Q_{ge}	Gate-Emitter Charge		-	26	-	nC
Q_{gc}	Gate-Collector Charge		-	76	-	nC

Electrical Characteristics of DIODE ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)

Symbol	Parameter	Conditions	Min	Typ	Max	Units	
V_{FM}	Diode Forward Voltage	$I_F = 50\text{A}$	$T_C = 25^\circ\text{C}$	-	1.9	2.8	V
			$T_C = 100^\circ\text{C}$	-	1.8	-	
t_{rr}	Diode Reverse Recovery Time	$I_F = 50\text{A}$ $di/dt = 100\text{ A/us}$	$T_C = 25^\circ\text{C}$	-	76	100	ns
			$T_C = 100^\circ\text{C}$	-	138		
I_{rr}	Diode Peak Reverse Recovery Current	$I_F = 50\text{A}$ $di/dt = 100\text{ A/us}$	$T_C = 25^\circ\text{C}$	-	4	5.2	A
			$T_C = 100^\circ\text{C}$	-	6		
Q_{rr}	Diode Reverse Recovery Charge	$I_F = 50\text{A}$ $di/dt = 100\text{ A/us}$	$T_C = 25^\circ\text{C}$	-	152	260	nC
			$T_C = 100^\circ\text{C}$	-	404		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (IGBT Part, per 1/2 Module)	-	0.4	$^\circ\text{C/W}$
$R_{\theta JC}$	Junction-to-Case (DIODE Part, per 1/2 Module)	-	1.0	$^\circ\text{C/W}$
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.05	-	$^\circ\text{C/W}$
Weight	Weight of Module	-	90	g