



ELECTRICAL SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted)							
	PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Input rectifier	Maximum forward voltage drop	V_{FM}	$I_F = 25\text{ A}$	-	-	1.5	V
	Maximum reverse leakage current	I_{RM}	$T_J = 25\text{ }^\circ\text{C}, V_R = 1600\text{ V}$	-	-	0.1	mA
			$T_J = 150\text{ }^\circ\text{C}, V_R = 1600\text{ V}$	-	-	1.0	
	Forward slope resistance	r_T	$T_J = 150\text{ }^\circ\text{C}$	-	-	10.4	m Ω
Conduction threshold voltage	$V_{F(TO)}$	-		-	0.85	V	
Brake IGBT	Collector to emitter breakdown voltage	$BV_{(CES)}$	$V_{GE} = 0\text{ V}, I_C = 500\text{ }\mu\text{A}$	1200	-	-	V
	Temperature coefficient of breakdown voltage	$\Delta V_{(BR)CES}/\Delta T_J$	$V_{GE} = 0\text{ V}, I_C = 1\text{ mA}$ ($25\text{ }^\circ\text{C}$ to $125\text{ }^\circ\text{C}$)	-	1.0	-	V/ $^\circ\text{C}$
	Collector to emitter voltage	$V_{CE(on)}$	$I_C = 25\text{ A}, V_{GE} = 15\text{ V}$	-	2.4	2.7	V
			$I_C = 40\text{ A}, V_{GE} = 15\text{ V}$	-	2.95	3.3	
			$I_C = 25\text{ A}, V_{GE} = 15\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	2.85	-	
			$I_C = 40\text{ A}, V_{GE} = 15\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	3.55	-	
	Gate threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 250\text{ }\mu\text{A}$	4.0	5.0	6.0	
	Threshold voltage temperature coefficient	$\Delta V_{GE(th)}/\Delta T_J$	$V_{CE} = V_{GE}, I_C = 1\text{ mA}$ ($25\text{ }^\circ\text{C}$ to $125\text{ }^\circ\text{C}$)	-	-10	-	mV/ $^\circ\text{C}$
	Zero gate voltage collector current	I_{CES}	$V_{GE} = 0\text{ V}, V_{CE} = 1200\text{ V}$	-	-	100	μA
			$V_{GE} = 0\text{ V}, V_{CE} = 1200\text{ V}$ $T_J = 125\text{ }^\circ\text{C}$	-	750	-	
	Gate to emitter leakage current	I_{GES}	$V_{GE} = \pm 20\text{ V}$	-	-	± 200	nA
	Total gate charge (turn-on)	Q_G	$I_C = 25\text{ A}$ $V_{CC} = 400\text{ V}$ $V_{GE} = 15\text{ V}$	-	175	265	nC
	Gate to emitter charge (turn-on)	Q_{GE}		-	17.5	30	
	Gate to collector charge (turn-on)	Q_{GC}		-	81	125	
	Turn-on switching loss	E_{on}	$I_C = 25\text{ A}, V_{CC} = 600\text{ V}$ $V_{GE} = 15\text{ V}, R_G = 102\text{ }\Omega, L = 400\text{ }\mu\text{H},$ $T_J = 25\text{ }^\circ\text{C}^{(1)}$	-	2.45	4.45	mJ
	Turn-off switching loss	E_{off}		-	2.05	3.20	
	Total switching loss	E_{tot}		-	4.50	7.65	
Turn-on switching loss	E_{on}	$I_C = 15\text{ A}, V_{CC} = 600\text{ V}$ $V_{GE} = 15\text{ V}, R_G = 10\text{ }\Omega, L = 400\text{ }\mu\text{H},$ $T_J = 125\text{ }^\circ\text{C}^{(1)}$	-	3.35	5.65	mJ	
Turn-off switching loss	E_{off}		-	2.85	3.85		
Total switching loss	E_{tot}		-	6.20	9.50		
Turn-on delay time	$t_{d(on)}$	$I_C = 25\text{ A}, V_{CC} = 600\text{ V}$ $V_{GE} = 15\text{ V}, R_G = 10\text{ }\Omega, L = 400\text{ }\mu\text{H},$ $T_J = 125\text{ }^\circ\text{C}$	-	80	104	ns	
Rise time	t_r		-	50	70		
Turn-off delay time	$t_{d(off)}$		-	510	1000		
Fall time	t_f		-	230	299		
Brake IGBT	Input capacitance	C_{ies}	$V_{GE} = 0\text{ V}$ $V_{CC} = 30\text{ V}$ $f = 1\text{ MHz}$	-	2370	-	pF
	Output capacitance	C_{oes}		-	455	-	
	Reverse transfer capacitance	C_{res}		-	60	-	
	Reverse bias safe operating area	RBSOA	$T_J = 150\text{ }^\circ\text{C}, I_C = 80\text{ A}$ $R_G = 10\text{ }\Omega, V_{GE} = 15\text{ V to } 0\text{ V}$	Fullsquare			
	Short circuit safe operating area	SCSOA	$T_J = 150\text{ }^\circ\text{C}$ $V_{CC} = 900\text{ V}, V_P = 1200\text{ V}$ $R_G = 10\text{ }\Omega, V_{GE} = 15\text{ V to } 0\text{ V}$	10	-	-	μs

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	PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Brake Diode	Diode peak reverse recovery current	I_{rr}	$T_J = 125\text{ }^\circ\text{C}$ $V_{CC} = 600\text{ V}$, $I_F = 25\text{ A}$, $L = 400\text{ }\mu\text{H}$ $R_G = 10\text{ }\Omega$, $V_{GE} = 15\text{ V}$	-	35	-	A
	Diode forward voltage drop	V_{FM}	$I_F = 25\text{ A}$	-	1.90	2.35	V
			$I_F = 40\text{ A}$	-	2.25	2.80	
			$I_F = 25\text{ A}$, $T_J = 125\text{ }^\circ\text{C}$	-	2.0	-	
			$I_F = 40\text{ A}$, $T_J = 125\text{ }^\circ\text{C}$	-	2.45	-	
NTC	Resistance	R	$T_J = 25\text{ }^\circ\text{C}$	4538	5000	5495	Ω
			$T_J = 100\text{ }^\circ\text{C}$	468.6	493.3	518	
	B value	B	$T_J = 25\text{ }^\circ\text{C}/50\text{ }^\circ\text{C}$	3307	3375	3443	K

Note

(1) Energy losses include “tail” and diode reverse recovery

THERMAL AND MECHANICAL SPECIFICATIONS					
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS
Junction to case inverter IGBT thermal resistance	R_{thJC}	-	-	0.63	$^\circ\text{C}/\text{W}$
Junction to case inverter FRED thermal resistance		-	-	1.0	
Junction to case brake DIODE thermal resistance		-	-	1.0	
Junction to case brake IGBT thermal resistance		-	-	0.63	
Junction to case input rectifier thermal resistance		-	-	0.85	
Case to sink, flat, greased surface	R_{thCS}	-	0.05	-	
Mounting torque (M5)		2.7	-	3.3	Nm
Weight		-	170	-	g