



SWITCHING CHARACTERISTICS ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Q1 and Q4 IGBT with D5 and D6 CLAMP DIODE							
Turn-on switching loss	E_{on}	$I_C = 150\text{ A}$ $V_{CC} = 325\text{ V}$ $V_{GE} = 15\text{ V}$ $R_g = 4.7\text{ }\Omega$ $L = 500\text{ }\mu\text{H}^{(1)}$	-	0.69	-	mJ	
Turn-off switching loss	E_{off}		-	3.4	-		
Total switching loss	E_{tot}		-	4.1	-		
Turn-on delay time	$t_{d(on)}$			-	161	-	ns
Rise time	t_r			-	108	-	
Turn-off delay time	$t_{d(off)}$			-	139	-	
Fall time	t_f	-		91	-		
Turn-on switching loss	E_{on}	$I_C = 150\text{ A}$ $V_{CC} = 325\text{ V}$ $V_{GE} = 15\text{ V}$ $R_g = 4.7\text{ }\Omega$ $L = 500\text{ }\mu\text{H}$ $T_J = 125\text{ }^\circ\text{C}^{(1)}$	-	0.9	-	mJ	
Turn-off switching loss	E_{off}		-	4.2	-		
Total switching loss	E_{tot}		-	5.1	-		
Turn-on delay time	$t_{d(on)}$			-	160	-	ns
Rise time	t_r			-	109	-	
Turn-off delay time	$t_{d(off)}$			-	150	-	
Fall time	t_f	-		97	-		
Q2 and Q3 IGBT with D2 and D3 AP DIODE							
Turn-on switching loss	E_{on}	$I_C = 150\text{ A}$ $V_{CC} = 325\text{ V}$ $V_{GE} = 15\text{ V}$ $R_g = 4.7\text{ }\Omega$ $L = 500\text{ }\mu\text{H}^{(1)}$	-	0.8	-	mJ	
Turn-off switching loss	E_{off}		-	4.0	-		
Total switching loss	E_{tot}		-	4.8	-		
Turn-on delay time	$t_{d(on)}$			-	144	-	ns
Rise time	t_r			-	117	-	
Turn-off delay time	$t_{d(off)}$			-	144	-	
Fall time	t_f	-		98	-		
Turn-on switching loss	E_{on}	$I_C = 150\text{ A}$ $V_{CC} = 325\text{ V}$ $V_{GE} = 15\text{ V}$ $R_g = 4.7\text{ }\Omega$ $L = 500\text{ }\mu\text{H}$ $T_J = 125\text{ }^\circ\text{C}^{(1)}$	-	0.98	-	mJ	
Turn-off switching loss	E_{off}		-	4.7	-		
Total switching loss	E_{tot}		-	5.7	-		
Turn-on delay time	$t_{d(on)}$			-	166	-	ns
Rise time	t_r			-	120	-	
Turn-off delay time	$t_{d(off)}$			-	153	-	
Fall time	t_f	-		106	-		
Reverse bias safe operating area	RBSOA	$T_J = 175\text{ }^\circ\text{C}$, $I_C = 180\text{ A}$, $V_{CC} = 325\text{ V}$, $V_P = 650\text{ V}$, $R_g = 4.7\text{ }\Omega$, $V_{GE} = 15\text{ V}$ to 0 V	Fullsquare				
Short circuit safe operating area	SCSOA	$R_g = 5.0\text{ }\Omega$, $V_{CC} = 400\text{ V}$, $V_P = 600\text{ V}$, $V_{GE} = 15\text{ V}$ to 0 , $T_J = 150\text{ }^\circ\text{C}$	-	-	5.5	μs	
D5 - D6 CLAMPING DIODE							
Diode reverse recovery time	t_{rr}	$V_R = 200\text{ V}$ $I_F = 50\text{ A}$ $di/dt = 500\text{ A}/\mu\text{s}$	-	78	-	ns	
Diode peak reverse current	I_{rr}		-	11	-	A	
Diode recovery charge	Q_{rr}		-	433	-	nC	
Diode reverse recovery time	t_{rr}	$V_R = 200\text{ V}$ $I_F = 50\text{ A}$ $di/dt = 500\text{ A}/\mu\text{s}$, $T_J = 125\text{ }^\circ\text{C}$	-	155	-	ns	
Diode peak reverse current	I_{rr}		-	28	-	A	
Diode recovery charge	Q_{rr}		-	2150	-	nC	
D1 - D2 - D3 - D4 AP DIODE							
Diode reverse recovery time	t_{rr}	$V_R = 200\text{ V}$ $I_F = 50\text{ A}$ $di/dt = 500\text{ A}/\mu\text{s}$	-	82	-	ns	
Diode peak reverse current	I_{rr}		-	11	-	A	
Diode recovery charge	Q_{rr}		-	363	-	nC	
Diode reverse recovery time	t_{rr}	$V_R = 200\text{ V}$ $I_F = 50\text{ A}$ $di/dt = 500\text{ A}/\mu\text{s}$, $T_J = 125\text{ }^\circ\text{C}$	-	134	-	ns	
Diode peak reverse current	I_{rr}		-	22	-	A	
Diode recovery charge	Q_{rr}		-	1500	-	nC	

Note

(1) Energy losses include "tail" and diode reverse recovery



INTERNAL NTC - THERMISTOR SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	TYP.	UNITS
Resistance	R25	$T_J = 25\text{ }^\circ\text{C}$	$5000 \pm 5\%$	Ω
	R125	$T_J = 100\text{ }^\circ\text{C}$	$493 \pm 5\%$	
B-constant	B	$R_2 = R_{25} \text{ exp. } [B_{25/50} (1/T_2 - 1/(298.15\text{ K}))]$	$3375 \pm 5\%$	K
Temperature range			-40 to +125	$^\circ\text{C}$
Maximum operating temperature			220	
Dissipation constant			2	mW/ $^\circ\text{C}$
Thermal time constant			8	s

THERMAL AND MECHANICAL SPECIFICATIONS					
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS
Q1 to Q4 IGBT - junction to case thermal resistance (per switch)	R_{thJC}	-	-	0.25	$^\circ\text{C/W}$
D5 - D6 clamping diode - junction to case thermal resistance (per diode)		-	-	0.47	
D1 - D2 - D3 - D4 AP diode - junction to case thermal resistance (per diode)		-	-	0.63	
Q1 to Q4 IGBT - case to sink thermal resistance (per switch)	$R_{thCS}^{(1)}$	-	0.62	-	
D5 - D6 clamping diode - case to sink thermal resistance (per diode)		-	0.7	-	
D1 - D2 - D3 - D4 AP diode - case to sink thermal resistance (per diode)		-	0.7	-	
Case to sink thermal resistance per module		-	0.1	-	
Mounting torque (M4)		2	-	3	Nm
Weight		-	45	-	g

Note

(1) Mounting surface flat, smooth, and greased

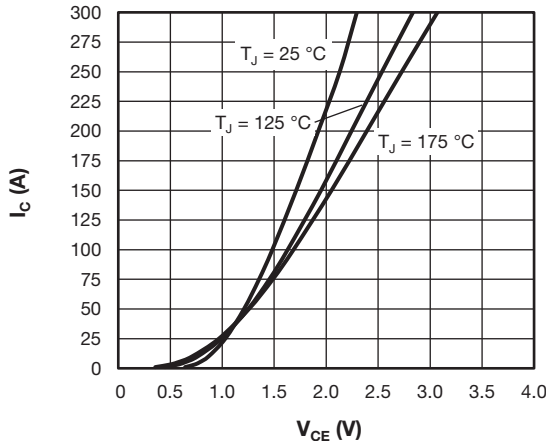


Fig. 1 - I_C vs. V_{CE} ,
Typical Q1 to Q4 Trench IGBT Output Characteristics,
 $V_{GE} = 15\text{ V}$

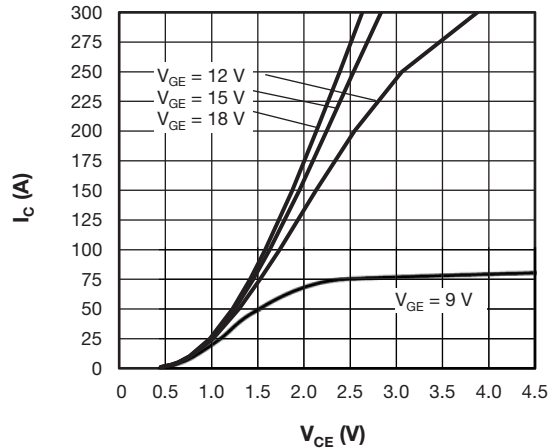


Fig. 2 - I_C vs. V_{CE}
Typical Q1 to Q4 Trench IGBT Output Characteristics,
 $T_J = 125\text{ }^\circ\text{C}$