

Switching Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max	Units	Conditions
Q_g	Total Gate Charge	—	50	75	nC	$I_C = 24\text{A}$ $V_{GE} = 15\text{V}$ $V_{CC} = 400\text{V}$
Q_{ge}	Gate-to-Emitter Charge	—	13	20		
Q_{gc}	Gate-to-Collector Charge	—	21	31		
E_{on}	Turn-On Switching Loss	—	115	201	μJ	$I_C = 24\text{A}$, $V_{CC} = 400\text{V}$, $V_{GE} = 15\text{V}$ $R_G = 10\Omega$, $L = 200\mu\text{H}$, $L_S = 150\text{nH}$, $T_J = 25^\circ\text{C}$
E_{off}	Turn-Off Switching Loss	—	600	700		
E_{total}	Total Switching Loss	—	715	901		
$t_{d(on)}$	Turn-On delay time	—	41	53	ns	Energy losses include tail & diode reverse recovery ⑤
t_r	Rise time	—	22	31		
$t_{d(off)}$	Turn-Off delay time	—	104	115		
t_f	Fall time	—	29	41		
E_{on}	Turn-On Switching Loss	—	420	—	μJ	$I_C = 24\text{A}$, $V_{CC} = 400\text{V}$, $V_{GE} = 15\text{V}$ $R_G = 10\Omega$, $L = 200\mu\text{H}$, $L_S = 150\text{nH}$, $T_J = 175^\circ\text{C}$
E_{off}	Turn-Off Switching Loss	—	840	—		
E_{total}	Total Switching Loss	—	1260	—		
$t_{d(on)}$	Turn-On delay time	—	40	—	ns	Energy losses include tail & diode reverse recovery ⑤
t_r	Rise time	—	24	—		
$t_{d(off)}$	Turn-Off delay time	—	125	—		
t_f	Fall time	—	39	—		
C_{ies}	Input Capacitance	—	1490	—	pF	$V_{GE} = 0\text{V}$ $V_{CC} = 30\text{V}$ $f = 1.0\text{MHz}$
C_{oes}	Output Capacitance	—	129	—		
C_{res}	Reverse Transfer Capacitance	—	45	—		
RBSOA	Reverse Bias Safe Operating Area	FULL SQUARE				$T_J = 175^\circ\text{C}$, $I_C = 96\text{A}$ $V_{CC} = 480\text{V}$, $V_p \leq 600\text{V}$ $R_G = 10\Omega$, $V_{GE} = +20\text{V to } 0\text{V}$
SCSOA	Short Circuit Safe Operating Area	5.0	—	—	μs	$V_{CC} = 400\text{V}$, $V_p \leq 600\text{V}$ $R_G = 10\Omega$, $V_{GE} = +15\text{V to } 0\text{V}$
E_{rec}	Reverse Recovery Energy of the Diode	—	621	—	μJ	$T_J = 175^\circ\text{C}$
t_{rr}	Diode Reverse Recovery Time	—	89	—	ns	$V_{CC} = 400\text{V}$, $I_F = 24\text{A}$, $V_{GE} = 15\text{V}$,
I_{rr}	Peak Reverse Recovery Current	—	37	—	A	$R_G = 10\Omega$, $L = 200\mu\text{H}$, $L_S = 150\text{nH}$

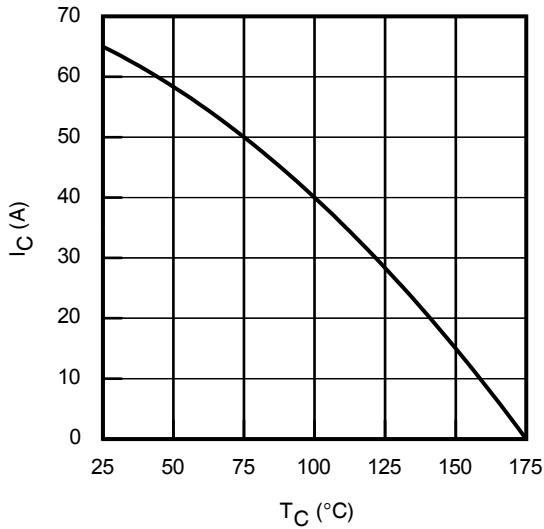


Fig. 1 - Maximum DC Collector Current vs. Case Temperature

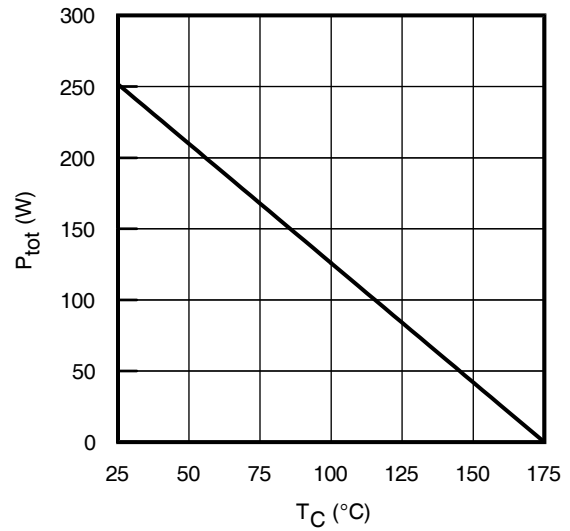


Fig. 2 - Power Dissipation vs. Case Temperature

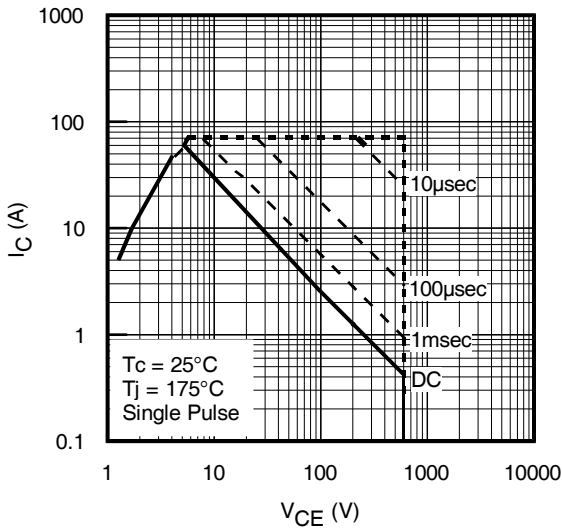


Fig. 3 - Forward SOA

$T_C = 25^\circ\text{C}$; $T_J \leq 175^\circ\text{C}$; $V_{GE} = 15\text{V}$

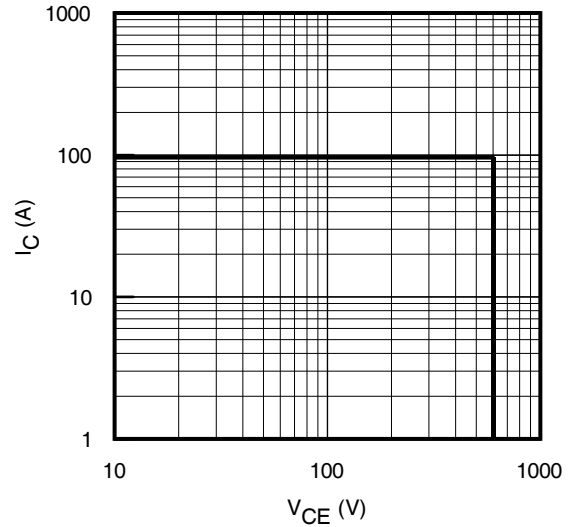


Fig. 4 - Reverse Bias SOA

$T_J = 175^\circ\text{C}$; $V_{GE} = 20\text{V}$

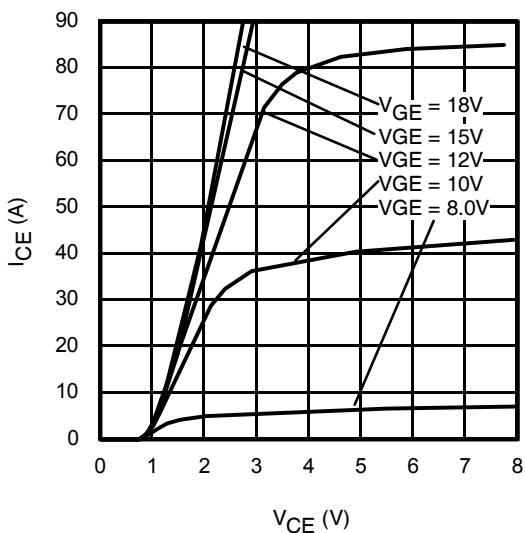


Fig. 5 - Typ. IGBT Output Characteristics
 $T_J = -40^\circ\text{C}$; $t_p = 80\mu\text{s}$

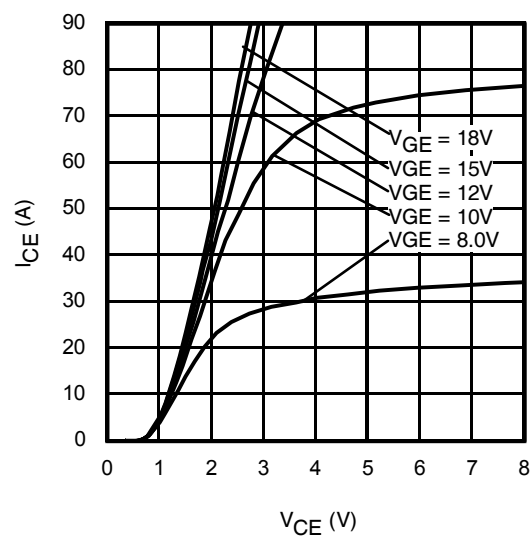


Fig. 6 - Typ. IGBT Output Characteristics
 $T_J = 25^\circ\text{C}$; $t_p = 80\mu\text{s}$